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Illinois Environmental Protection Agency

Final Remedial Investigation Report for the Southeast Rockford Source Control Operable Unit

July 25, 2000

Appendices

Appendix A

APPENDIX A
DATA USABILITY EVALUATION
JULY 2000

Contents

1 PURPOSE OF DATA USEABILITY EVALUATION

The purpose of this evaluation is to determine the useability of all data collected by Camp, Dresser & McKee Inc. (CDM) as outlined in the approved Final Southeast Rockford Groundwater Contamination Source Control Operable Unit Sampling and Analysis Plan Addendum (SAP) (CDM 1996a) and Quality Assurance Project Plan Addenda (QAPP) (CDM 1996b) during the field sampling program at the Southeast Rockford site, Source Control Operable Unit in Rockford, Illinois. This data will, in turn, be used to support the Risk Assessment and Feasibility Study.

1.1 QUALITY CONTROL MEASURES

Quality Assurance/Quality Control (QA/QC) measures are applicable to all aspects of the field sampling and analysis program. The approved QAPP details the QA/QC measures deemed necessary to produce useable data from field screening and analysis as well as laboratory analysis. To determine the extent of useability of sampling results, the degree to which these QA/QC measures were followed in the field and by the laboratories will be evaluated. Section 1 outlines the major QA/QC requirements given in the QAPP Addenda (CDM 1996b). Sections 2 through 4 evaluate the extent to which CDM and the laboratory programs met these requirements.

1.1.1 FIELD SAMPLING QA/QC REQUIREMENTS

There were several types of QC samples collected during the field sampling program including field blanks, trip blanks, field duplicate samples, and matrix spike/matrix spike duplicate (MS/MSD) samples. Different data acquisition methods such as sampling procedures for field screening, field analysis, field analytical laboratory, and external laboratory programs each specify which type and at what frequency these QC samples will be taken. The field analytical laboratory used was Landmark Environmental & Engineering Solutions (Geoprobe Soil Gas Analysis). The external laboratory programs used include the U.S. EPA Contract Laboratory Program (CLP) and National Environmental Testing Inc (NET) (an independent laboratory). The field sampling program at the Southeast Rockford Source Control Operable Units (SCOUs) utilized all four types of data acquisition methods as follows:

Field Screening

- Health and safety monitoring (e.g., organic vapors)
- Area 7 surface water screening - water quality parameters (pH, conductivity, temperature)
- Qualitative organic vapor screening with PID or OVA during soil sample collection

Field Analysis/ Field Analytical Laboratory

- Soil gas survey with field gas chromatograph (GC)

Samples Collected for External Analytical Laboratories - CLP and NET

- Subsurface soil samples collected during geoprobe work (Areas 4, 7, 9/10 and 11)
- Deep soil borings - soils collected during drilling (Areas 4, 7, 9/10 and 11)
- Area 7 Creek Sediment
- Area 7 Surface Water
- Surface Soil (Areas 4, 7, 9/10 and 11)
- Soil Gas Samples (Areas 4, 7, 9/10 and 11)
- Groundwater Screening at MW201, MW202 and MW203

The frequency at which QC samples were taken was based on the analytical data quality objectives (DQOs) specified in the QAPP Addenda (CDM 1996b) in **Section 1-4**. DQOs are qualitative and quantitative statements which specify the quality of the data required to support decisions made during the Remedial Investigation/Feasibility Study (RI/FS) activities and are based on the end use of the data to be collected. As such, different data uses may require different levels of data quality. The field program at the Southeast Rockford SCOUs collected samples for analysis at analytical DQO Levels 1, 2, 3, and 4.

The specific QC requirements for each laboratory program mentioned earlier are discussed in detail in **Sections 3 and 8 of the** QAPP Addenda. Similarly, the field screening and analysis QC procedures are found in **Appendix A, B and I of the** QAPP Addenda (CDM 1996b). In general, the level of QC laboratory requirements from highest (requiring the highest frequency of QC samples) to lowest are:

- Analytical DQO Level 4: CLP laboratory (analysis according to Routine Analytical Service [RAS] protocols)
- Analytical DQO Level 3: NET (groundwater screening)

- Analytical DQO Level 2: Field analysis (geoprobe soil gas)
- Analytical DQO Level 1: Field screening

The following discussion will define and explain the significance of each type of QC sample. Later evaluation subsections and the data useability evaluation sheets given as **Attachment I** will explain how these QC requirements were met during each of the data acquisition/sampling methods mentioned above.

1.1.1.1 Field Blanks

Field blanks are collected to assess the quality of the data resulting from the field sampling program. These blanks are analyzed to check for procedural contamination at the site which may cause sample contamination. For this field sampling program, all field blanks collected were equipment rinsate blanks and so for this discussion, field blank and rinsate blank may be used interchangeably. These blanks are prepared in the field by members of the field sampling team by filling water sample bottles with reagent-grade distilled water from the sampling device (if possible), at the same volume as the surface water samples; these samples are prepared in close proximity to an actual sample location. This type of blank provides additional information about the effectiveness of the decontamination procedures used by the field personnel. The approved level of QC effort for the Southeast Rockford SCOU study was one field blank prepared for every ten surface water samples collected.

1.1.1.2 Trip Blanks

These QC blanks are used to assess the potential for contamination of samples due to contamination during sample shipment and storage. The trip blanks consisted of preserved 40 milliliter volatile vials filled with reagent-grade distilled water which were provided by U.S. EPA. These trip blanks were prepared off-site, in the laboratory, transported to the field, and then shipped with the other volatile analysis samples to the scheduled laboratory without being opened. One volatile organic analysis (VOA) trip blank consisting of two vials was to be included in each cooler shipment for VOA analysis (water samples only, as per the SAP - Table 1-1).

1.1.1.3 Duplicate Samples

A duplicate sample is an independent sample collected at the same location and time as an investigative sample. Duplicate samples are analyzed to assess the homogeneity of the sampled media and the precision of the sampling and analytical protocol. One duplicate soil/sediment sample was to be collected for every 20 samples (or portion thereof) collected in the field. One

duplicate surface water sample was to be collected for every 10 samples (or portion thereof) collected in the field. Duplicate samples should be collected at the same sample volume and in the same type of container as other samples. Duplicate sample quantities and collection shall apply to both soil and water samples.

1.1.1.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples

Matrix spike samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Organic matrix spikes are performed in duplicate and are, therefore, most often referred to as matrix spike/matrix spike duplicate (MS/MSD) samples. Generally the sample coordinator can designate a sample as an MS/MSD after sample collection and before being sent to the laboratory. However, for volatile or semivolatile MS/MSD samples, laboratories usually require additional sample volume and, therefore, the field personnel must collect extra volume in the field for those samples predesignated by the sample coordinator as MS/MSDs. In this case, the SAP specified that water samples for semivolatile (extractables and pesticides/PCBs) MS/MSD analysis would be collected at double volume at a frequency of one per twenty or fewer investigative samples. MS/MSD samples were to be collected at a frequency of one per 20 investigative samples per matrix (soil/sediment or water).

1.1.2 Quality Control Criteria

The extent of the useability of the data is at the discretion of the quality control criteria which include completeness, comparability, representativeness, precision and accuracy. These criteria are defined below and are the guidelines applied in the data useability evaluation sheets given in Attachment I of this data useability evaluation. These sheets summarize the extent to which these criteria were met.

1.1.2.1 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount that was expected to be obtained under normal conditions. The percent completeness is calculated by the following calculation:

completeness (%) =
[(number of valid data)/(number of sample collected for each parameter analyzed)] x 100

The completeness criterion is defined by the project data quality objectives. For this project, the completeness criteria for the U.S. EPA CLP approved laboratory is 95 percent. For the field sampling program at the Southeast Rockford SCOU site, the percent completeness of the data

for each category of testing is as follows: CLP = 100 percent, NET = 100% (see Table 1 in **Attachment III** of this data useability evaluation for calculation). The percent completeness for data collected in the field was 100 percent for the soil gas analysis and all other field screening measurements.

1.1.2.2 Comparability

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods.

The procedures used to obtain the planned analytical data, as documented in the QAPP Addenda (CDM 1996b) and SAP Addendum (CDM 1996a), are expected to provide comparable data. This is further supported by the approval of both documents by U.S. EPA. CDM also collected data during the Southeast Rockford Phase II investigation; because the SAP and QAPP used for this SCOU investigation are addendums to the Phase II investigation, similar documented analytical procedures and planning methods were utilized and so data produced are comparable.

1.1.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, and process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol.

Representativeness is satisfied by following the Final Southeast Rockford Source Control Operable Unit Work Plan (CDM 1996c) and SAP Addendum (CDM 1996a), implementing proper sampling techniques, using proper analytical procedures and analyzing samples within holding times. Data representativeness for the Southeast Rockford SCOU field program was demonstrated by QA field audits performed throughout the field work by the CDM's field manager and by information provided by the CLP laboratories in data narratives regarding the acceptable condition of samples received (see **Attachment I**).

1.1.2.4 Precision

Precision is a measure of the agreement among separate measurements of the same sample. This can be assessed from the results of the duplicate analysis performed on the samples. Field duplicates were collected and sent to the CLP and NET laboratories for analysis.

Both field duplicate samples are evaluated by calculating the relative percent difference (RPD) for these sample results. The RPD is calculated as follows:

RPD = [(sample-duplicate)/(0.5 x (sample+duplicate))] x 100

Results for this calculation for the field duplicates are given as attachments to each of the data useability evaluation sheets where applicable in **Attachment I** of this data useability evaluation. For discussion purposes, an RPD limit of 30 percent was set to evaluate the precision of the field duplicates. This 30 percent limit indicates a good level of precision.

The overall precision of the data resulting from the Southeast Rockford SCOU field sampling program was acceptable.

1.1.2.5 Accuracy

Accuracy is the degree of agreement of a data point with the true value. This accuracy is achieved when analytical laboratories and field personnel follow the analytical and field instrument calibration procedures as outlined in the QAPP Addenda (CDM 1996b) and SAP Addendum (CDM 1996a).

Accuracy of the on-site laboratory for soil gas volatile analysis is assessed using continuing calibration and system blanks and ambient air samples. Information about all of these items was detailed in the Analytical Report Southeast Rockford Quality Control Samples (July 1, 1996) provided by the Landmark Environmental & Engineering Solutions on-site laboratory. This information was considered when evaluating the data for useability.

Accuracy of the field measurements is assessed by conducting proper instrument calibrations and calibration checks. The Southeast Rockford SCOU study field team documented in its logbooks that surface water quality parameters of pH, conductivity and temperature were collected using a HYDAC water quality meter. This instruments was calibrated and operated in accordance with the procedures outlined the instrument operating instructions.

Accuracy of analytical laboratory results was assessed for compliance with the established QC criteria that are described in general in this Appendix in Section 1.1.1 and in more detail in **Section 3 - 4** of the QAPP Addenda (CDM 1996b). The QC criteria are assessed using analytical results for laboratory method blanks, reagent/preparation blanks, matrix spikes/matrix spike duplicates samples and field blanks. Information about these QC samples is detailed in the accompanying data useability evaluation sheets in **Attachment I** of this data useability evaluation and in Section 3 of this evaluation. Furthermore, the laboratory reports provided by

CLP and NET all indicate that samples were analyzed using the methods provided in the QAPP Addenda (CDM 1996b).

The overall accuracy of the data resulting from the Southeast Rockford SCOU field sampling program was acceptable.

1.1.3 Sample Management and Handling

All sample management and handling procedures were performed as outlined in the QAPP Addenda (CDM 1996b) and SAP Addendum (CDM 1996a), with the exception of two minor incidents of improper sample labeling procedures. First, the SAP (CDM 1996a) specifies that blank and duplicate samples be designated with a final one-letter suffix in parentheses added to the end of the normal sample number (e.g., SW-01(R) and SW-01(D) represent the blank and duplicate sample at location SW-01). During the field program, a decision was made to designate blank and duplicate samples by adding -B and -D respectively to the sample number written on the sample labels and the chain of custody forms. For discussion throughout this evaluation, the -B for blank and -D for duplicate labeling convention is used.

Second, field personnel designated shallow and deep subsurface soil samples with "(S)" and "(D)" respectively at the end of the normal sample number. This is a deviation from the "A" and "B" labels specified in the SAP for shallow and deep samples (e.g., the shallow subsurface soil sample in Area 9/10 taken at sample location #202 would have the sample number SB9/10-202(S)). Similarly, for the deep soil borings, field personnel designated the sample depth by adding the numerical depth in feet to the end of the sample number instead of the A, B, C, etc. convention (e.g., the deep soil boring in Area 9/10 taken at sample location #202 at a depth of 18 feet would have the sample number SB9/10-202-18). Note that these two different sample naming conventions were an important and justifiable variance because this allowed field personnel to provide clarity between subsurface soil samples collected during geoprobe work (e.g., SB9/10-202(S) or SB9/10-202(D)) and deep soil borings collected during drilling (e.g., SB9/10-202-18).

Neither of these exceptions affects the data useability.

2 FIELD ANALYSIS AND FIELD SCREENING

Field analysis, analytical DQO Level 2, was performed to provide measurements of volatile organic compounds (VOCs) in soil gas. The level of the QC effort for this field analysis is specified in **Appendix A** of the QAPP Addenda (CDM 1996b). Field screening, analytical DQO Level 1, was used to provide estimates of water quality parameters (e.g., pH, conductivity and temperature), perform qualitative organic vapor screening during soil/sediment sample collection and to monitor ambient air quality for health and safety purposes (e.g., organic vapors). The level of the QC effort for field screening involved daily (or as needed) calibration of the instruments for accuracy and obtaining multiple readings on a single sample or standard as specified in the QAPP Addenda (CDM 1996b).

2.1 Field Analysis

The soil gas survey in all SCOU Areas 4, 7, 9/10 and 11 qualifies as field analysis for screening purposes.

2.1.1 Soil Gas Survey

The soil gas survey of VOCs was conducted in Areas 4, 7, 9/10 and 11 to define contaminated areas in or near these source areas. A total of 323 soil gas sample locations were identified as potential sample locations and shown on Figures 4-2 through 4-5 of the SAP Addendum (CDM 1996a): Area 4 - 32 locations, Area 7 - 23 locations, Area 9/10 - 146 locations (30 contingency) and Area 11 - 47 locations (10 contingency). Terra-Trace was subcontracted to operate the geoprobe system and on-site analysis was performed by Landmark Environmental & Engineering Solutions field laboratory equipped with a SRI 9300 GC w/Purge & Trap (Soil Gas) and following an analysis method based on procedures defined in EPA SW-846 Method 8260 as specified in the QAPP Addenda (CDM 1996b).

Quality control requirements were provided in the SOP (SOP #GC 103c, Revision 2, revised 24 October 1995) for Soil Gas Sampling and Analysis in Appendix A of the QAPP Addenda (CDM 1996b). These soil gas sampling and analysis field QC requirements were revised with IEPA concurrence in a memo from the CDM Project Manager to Landmark dated 5/29/96 as follows:

Original SOP (10/24/95) calls for:

Continuing Calibration: Start and end of day and 1 every 10 samples
System Blank: Start of each day and with each Ambient Air sample
Ambient Air Sample: Start of each day and two additional per day
Duplicates: None Required

Revised SOP (5/29/96) calls for:

Continuing Calibration: Start and end of each day (or shift)
System Blank: Start and end of each day (or shift)
Ambient Air Sample: Start and end of each day (or shift) unless CDM indicates the need for additional ambient samples based on localized areas of high concentration. Ambient air samples will not exceed 3 per day (or shift)

Evaluation of the soil gas data shows that the following numbers of samples were collected at each SCOU: Area 4 - 35 locations, Area 7 - 8 locations, Area 9/10 - 119 locations and Area 11 - 54 locations. Quality control ambient air samples were completed at a rate of at least two per day of sampling from 5/20/96 through 6/21/96 except on 5/20, 6/6, 6/12 and 6/13 (only one) and 6/2 (none). Quality control system blanks were collected at a rate of at least two per day of sampling from 5/20/96 through 6/21/96 except on 5/20, 6/2, 6/6 and 6/13 (only one) and 5/21, 5/28 and 5/29 (none). Note that the lack of some QC samples should not effect the quality of the data; the QC samples that were collected on those days showed all non-detects for all of the volatile analytes. Nevertheless, the lack of the aforementioned system blanks and/or ambient air samples will be considered a slight data gap.

The table below lists the only system blanks and ambient air samples in which some volatile analytes were detected during analyses conducted from 5/20/96 through 6/21/96. In general, these analytes were detected at or near their detection limit and at low concentrations compared to detections in other investigative samples. Any BTEX detections in the ambient air samples is likely accounted for by local truck exhaust. In addition, note that the soil gas samples were used primarily for screening purposes rather than as conclusive data, and so the data use was not affected by low level concentrations in the system blank and ambient air samples.

Date of QC Sample(s)	Analytes in System Blanks (S) and/or Ambient Air Samples (A) [Note: A1, A2, A3, etc. indicates the first, second, third, etc. ambient air sample taken on that date] (concentration, ug/L)
5-22-96	S1 = toluene (1); A1 = toluene (2); A2 = toluene (4), ethylbenzene (6)
5-23-96	A3 = xylene isomers (14)

5-31-96	S1 = ethylbenzene (12); S2 = toluene (49), xylene isomers (160); A2 = xylene isomers (265)
6-4-96	A1 = toluene (6), ethylbenzene (1), xylene isomers (12); A2 = ethylbenzene (1)
6-5-96	A1 = toluene (3)
6-7-96	A2 = ethylbenzene (3), xylene isomers (170)
6-14-96	A1 = toluene (22)
6-17-96	A1 = ethylbenzene (1), xylene isomers (9), tetrachloroethene (2)
6-18-96	A1 = ethylbenzene (1), xylene isomers (3)
6-19-96	S1 = toluene (2), ethylbenzene (2), xylene isomers (8); A1 = toluene (2); S2 = 1,1,1-trichloroethane (1)
6-20-96	S1 = xylene isomers (4), trans-1,2-dichloroethene (6), 1,1-dichloroethane (4), cis-1,2-dichloroethene (2), tetrachloroethene (7) A1 = xylene isomers (3), trans-1,2-dichloroethene (5), 1,1-dichloroethane (3), cis-1,2-dichloroethene (5), tetrachloroethene (3);

Based on this evaluation, all of the soil gas data is considered useable as reported. No significant problems that may have qualified the data as unuseable were noted by field or on-site laboratory personnel who participated in the soil gas survey task.

2.2 Field Screening

The water quality analyses performed in the field at Area 7 during surface water sampling and qualitative organic vapor screening during soil sample collection qualify as field screening tasks.

The instruments used for the field screening tasks included the HYDAC water quality meter for the Area 7 surface water quality parameter screening and the H-Nu or Organic Vapor Meter photoionization detector (PID) and the Foxboro flame ionization detector (FID) for qualitative organic vapor screening during soil sample collection.

2.2.1 Area 7 Surface Water Quality Parameter Collection

Concurrent with the Area 7 surface water sampling, water quality parameters including pH, conductivity, and temperature were measured with the HYDAC water quality meter at each surface water sampling location. The field team documented in its logbooks that this field instrument was calibrated and operated by the procedures outlined in the QAPP Addenda

(CDM 1996b) and by the SOPs given in the SAP Addendum (CDM 1996a). Field team personnel examined the instrument to certify that it was in operating condition, performed calibration at the intervals specified by the manufacturer or more frequently if field conditions required (i.e., many instruments are affected by significant changes in ambient air temperature or humidity and require re-calibration) and recorded all instrument calibration data in the field logbooks in accordance with the requirements outlined in the QAPP Addenda (CDM 1996b) and SAP Addendum (CDM 1996a).

Field personnel collected, recorded and dated all water quality parameter measurements in the field logbooks, as required by the SAP (CDM 1996a). After completion of the field program, this data was put in tabular form for use in data interpretation.

2.2.2 Qualitative Organic Vapor Screening During Soil Collection

Concurrent with the soil sample collection in each SCOU area, soil samples were visually examined and then screened for organic vapors with a PID (either H-Nu or OVM) and/or FID (Foxboro), and selected samples showing elevated levels of VOCs were field tested for NAPL. Field screening results were used to select one sample from each boring in Areas 4, 7 and 11 for TCL VOC analysis by the CLP laboratory. Two samples per boring in Area 9/10 were collected for RAS VOC and RAS metals and cyanide analysis by the CLP laboratory.

The field team documented in its logbooks that field instruments used were calibrated and operated by the procedures outlined in the QAPP Addenda (CDM 1996b) and by the SOPs given in the SAP Addendum (CDM 1996a). Field team personnel examined the instruments to certify that they were in operating condition, performed calibration at the intervals specified by the manufacturer or more frequently if field conditions required (i.e., many instruments are affected by significant changes in ambient air temperature or humidity and require re-calibration) and recorded all instrument calibration data in the field logbooks in accordance with the requirements outlined in the QAPP Addenda (CDM 1996b) and SAP Addendum (CDM 1996a).

Field personnel collected, recorded and dated all measurements in the field logbooks, as required by the SAP. After completion of the field program, this data was used in soil boring logs for use in data interpretation.

3 DATA USEABILITY EVALUATION SHEETS

A data useability evaluation sheet was completed for each group of samples to establish the useability of each analysis performed by the various laboratories. These sheets serve to document the QC samples collected in association with the samples for each sampling task completed during the field program. These sheets also detail any inconsistencies that may appear throughout the data and present the final decision about the useability of the data. All sheets and an outline indexing each sheet are provided in **Attachment I** of this data useability evaluation. A few notes about assumptions and/or interpretive methods used in the useability evaluation are given below. In addition, definitions of data qualifiers referred to throughout the data useability evaluation sheets are given in **Attachment II** of this evaluation.

- In calculating the relative percent difference (RPD) for duplicate samples, only those compounds/elements which had results listed above the detection limits were compared and are presented on the attached calculation sheet. In some cases (especially with the CLP laboratory results), one sample result showed a non-detect, whereas the corresponding duplicate sample reported a detection, however, below the required detection limit. In these cases, RPD was not evaluated and is noted as such in the RPD section.

- Lack of field blank samples for soil and sediment samples does not constitute a data gap. Table 1-1 of the SAP specifies that field blank samples will be collected for water samples only (specifically Area 7 surface water samples). In addition, Table 1-1 of the SAP specifies that trip blanks "will be shipped with each shipment of volatile organics (water samples only); therefore, lack of trip blanks accompanying soil and sediment samples does not constitute a data gap.

- In general, common laboratory contaminants include methylene chloride, 2-butanone, acetone, and phthalate esters (common from latex gloves used in sample handling). Detection of these compounds in blank samples is evidence of laboratory contamination. The presence of these compounds is flagged as a non-detect (U) when the sample result is less than 10 times the blank result. In contrast, for analytes that are not common laboratory contaminants, the presence of the analyte is flagged as a non-detect (U) when the sample result is less than five times the blank result.

- The RPDs for soil and sediment samples were generally higher than those for the water samples. RPDs of less than or equal to 30 percent are generally acceptable. However, higher RPDs are not uncommon for environmental sampling, especially soil and sediment samples which tend to be heterogeneous and hard to replicate. Therefore, unless the laboratory report or other data validation indicates otherwise, analytical data for soil and sediment samples will be accepted regardless of RPD value.

3.1 Unuseable Data and Other Data Gaps

Unuseable data and data gaps are identified in bold lettering on the data useability evaluation sheets. A data gap occurs where the unuseable result was for a contaminant of concern of the area that was sampled or when an insufficient number of QC samples were collected. A data gap is not present where the unuseable result was not a contaminant of concern of the area sampled. The following section details all instances in which data was unuseable and where data gaps were found. These cases have been sorted first by area sampled and second alphabetically by sample type.

In each unuseable data case listed below, a determination is made whether the lack of data represents a data gap. Note that much of the unuseable data listed below do not represent data gaps because they involve analytes that are not contaminants of concern in the corresponding sampling areas.

3.1.1 Unuseable Data

AREA 4
All data collected in Area 4 has been deemed useable.

AREA 7
All data collected in Area 7 has been deemed useable.

AREA 9/10 - Subsurface Soil Samples
CLP Semivolatiles (BNA): For the semivolatile fraction for SB9/10-124(D), SB9/10-124(S)MS, SB9/10-124(D)RE and SB9/10-124(S)RE, the recovery of IS6 (perylene-d12) compounds (see Attachment II, Table 4) was below the QC limit. The recovery of IS6 for IS6 for SB9/10-124(S) was below the 10% expanded limit. The positive results for the target compounds associated with IS6 (perylene-d12) are flagged as estimated "J" and non-detected are deemed unuseable "R". Thus the results for all semivolatile IS6 compounds, which were non-detected in the

results, are unuseable. Note, however, that SB9/10-124(S) was reanalyzed as SB9/10-124(S)RE and those results are useable as qualified and so this the unuseable results do not constitute a data gap.

AREA 11
All data collected in Area 11 has been deemed useable.

3.1.2 Other Data Gaps

In addition to the data gaps resulting from unuseable data, the following cases also represent data gaps. These cases are generally QC samples that were not collected.

ALL AREAS
CLP RAS Total Metals/CN: No duplicate surface soil samples were collected in Area 7. Note however, that the sampling plan specifies only that one duplicate per soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 21 soil/sediment samples were collected for RAS total metals and cyanide and one (1) duplicate was collected. This indicates a lack of 1 duplicate for all soil/sediment matrix samples for RAS Total Metals/CN analysis and thus constitutes a minor data gap.

Soil Gas QC Volatiles: As described in Section 2.1.1, the revised Soil Gas Analysis SOP required a system blank and an ambient air blank at the start and end of each day (or shift). Based on the QC sample analytical report provided by Landmark, there were 25 days of analysis operation. Based on that working schedule we would expect at least 50 system blanks and 50 ambient air samples to be analyzed. The actual numbers of system blanks and ambient air samples analyzed is 41 and 49, respectively; this indicates a lack of 10 QC samples total. Further evaluation of the QC data shows that on some days more than the required QC samples were analyzed, and on other days a lack of QC samples were analyzed. Evaluating the lack of QC samples on a day-by-day basis indicates a lack of system blanks and ambient air samples of 10 and 6 respectively. Note that time data was not available to indicate the beginning and end of a shift, so it is possible that there were fewer days of analysis operation than appear and thus fewer QC samples would have been required. Nevertheless, to be conservative, a lack of a total of 16 QC samples will be considered the data gap for the soil gas survey data.

AREA 4
No data gaps exist in data for Area 4 samples, except for that described above.

AREA 7
No data gaps exist in data for Area 7 samples, except for that described above.

AREA 9/10
No data gaps exist in data for Area 9/10 samples, except for that described above.

AREA 11
No data gaps exist in data for Area 11 samples, except for that described above.

Note that although MS/MSD samples were not collected for each type of sample per area, a sufficient number of MS/MSD samples were collected per sample matrix (soil/sediment and water). The SAP specified that MS/MSD samples were to be collected at a frequency of one per 20 investigative samples per matrix (soil/sediment or water). Therefore, a lack of an MS/MSD sample in an area for a specific type of sample does not constitute a data gap since a sufficient number of MS/MSDs were collected overall per matrix.

4 Conclusion

The Southeast Rockford site, Source Control Operable Units 4, 7, 9/10 and 11 in Rockford, Illinois was successful in collecting the goal of 95 percent useable data as specified in the Final Southeast Rockford Groundwater Contamination Source Control Operable Unit Quality Assurance Project Plan (QAPP) Addenda (CDM 1996b). This goal was achieved with no major deviations from either the Quality Assurance Project Plan Addenda (CDM 1996b) or the Final Southeast Rockford Groundwater Contamination Source Control Operable Unit Sampling and Analysis Plan Addendum (CDM 1996a). All data gaps and unuseable data encountered in the evaluation of the useability of the data were minor and represent a loss of only two percent of the data proposed for collection during the sampling program. Therefore, 98 percent of the data is useable (see Table 1 as **Attachment III** of this data useability evaluation for calculation).

In addition to the text presented in Section 3, the data useability evaluation sheets given in **Attachment I** of this evaluation serve as a concise and complete summary of all of the exceptions and qualifications of the data. These sheets are provided for use in development of the Southeast Rockford Groundwater Contamination Source Control Operable Unit Remedial Investigation report and the Risk Assessment and Feasibility Study report to aid in the interpretation of the sampling results.

5 References

Camp Dresser & McKee Inc. (CDM). 1996a. *Final Southeast Rockford Groundwater Contamination Source Control Operable Unit Sampling and Analysis Plan Addendum, February 1996.*

Camp Dresser & McKee Inc. (CDM). 1996b. *Final Southeast Rockford Groundwater Contamination Source Control Operable Unit Quality Assurance Project Plan Addenda, February 1996 and June 1996.*

Camp Dresser & McKee Inc. (CDM). 1996c. *Southeast Rockford Groundwater Contamination Source Control Operable Unit Work Plan, February 1996.*

Landmark. July 1996. *Analytical Report Southeast Rockford Quality Control Samples.*

DATA USEABILITY EVALUATION SHEETS OUTLINE

[NOTE: A blue divider sheet has been placed between each of the major sections I, II, III, IV, V]

All samples were analyzed by an U.S. EPA Contract Laboratory Program (CLP) Laboratory or the National Environmental Testing Inc. (NET). Analyses performed per group of samples are noted in parentheses following the sample group name.

I. Area 4

A. Surface Soil (VOA/BNA/Pesticides/PCB/Total Metals/CN)
B. Subsurface Soil (Shallow & Deep Geoprobe) (VOA)
C. Deep Soil Borings (Drilling) (VOA)

II. Area 7

A. Surface Soil (VOA/BNA/Pesticides/PCB/Total Metals/CN
B. Subsurface Soil (Shallow & Deep Geoprobe) (VOA)
C. Deep Soil Borings (Drilling) (VOA)
D. Creek Sediment (VOA/BNA/Pesticides/PCB)
E. Surface Water (VOA/BNA/Pesticides/PCB)

III. Area 9/10

A. Surface Soil (VOA/BNA/Pesticides/PCB/Total Metals/CN)
B. Subsurface Soil (Shallow & Deep Geoprobe) (VOA only)
C. Subsurface Soil (Shallow & Deep Geoprobe) (VOA/BNA/Pesticides/PCB)
D. Deep Soil Borings (Drilling) (VOA/Total Metals/CN (1 = VOA/BNA/Pesticides/PCB))

IV. Area 11

A. Surface Soil (VOA/BNA/Pesticides/PCB/Total Metals/CN)
B. Subsurface Soil (Shallow & Deep Geoprobe) (VOA)
C. Deep Soil Boring (Drilling) (VOA)

V. Groundwater (VOA)

VI. Groundwater Screening (VOA)

DATA USEABILITY EVALUATION SHEET

Outline #:	I/A	**Lab:**	CLP
Area Sampled:	Area 4	**# of samples:**	5
Type of Sampling:	Surface Soil	**# of duplicates:**	1
Analyses Performed:	RAS VOA	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = SS4-203-D
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks = for low level soil volatiles - see narrative [associated samples]
VBLKM1 [SS4-201, -202, -203/MS/MSD, -205] - from data package SDG# EBFY0, Case #24750
VBLKC2 [SS4-204] - from data package SDG# EBFY0, Case #24750

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
– evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. The laboratory method blanks VBLKM1 and VBLKC2for this group of samples contained methylene chloride (10ug/kg and 4 ug/kg) and acetone (11 ug/kg and 12 ug/kg) respectively. Methylene chloride and acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than five (5) times the blank results.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

The duplicate samples were collected 1 per 20 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: **Yes** [X] **No** [ ]

[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***

If not, note discrepancies and explain:

For field duplicate samples SS4-203 and SS4-203-D, the RPD for all detected target analytes was less than 30%. Note that the RPD for 1,2-Dichloropropane was not evaluated because it was detected at a level below the detection limit in SS4-203 and was not detected in SS4-203-D. For target compounds which were not detected in either the duplicate sample or the corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [X] **No** [ ]

If not, note discrepancies and explain:

Sample SS4-203 was designated as the low level matrix spike/matrix spike duplicate sample. Matrix spikes were run in accordance with the SOP requirements and all spike recoveries and RPDs were within the QC limits; therefore the results are acceptable.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

All laboratory systems performance checks were within QC limits.

All data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	I/B	**Lab:**	CLP
Area Sampled:	Area 4	**# of samples:**	14
Type of Sampling:	Subsurface Soil	**# of duplicates:**	1
Analyses Performed:	RAS VOA	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = SB4-104(S)-D
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for low level soil volatiles - all from data package SDG# EBGA1, Case #24750.

- VBLKQ1 [SB4-103(S), SB4-103(D), SB4-104(S), SB4-104(S)-D, SB4-104(D), and SB4-107(D)]
- VBLKQ2 [SB4-107(D)MS/MSD, SB4-101(S), SB4-101(D), SB4-102(D), SB4-105(S), SB4-105(D), SB4-106(S), SB4-106(D), and SB4-107(S)]
- VBLKC2 [SB4-106(D) and SB4-102(S)]

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. All laboratory method blanks for this group of samples contained methylene chloride and acetone (see laboratory narrative for levels). Methylene chloride and/or acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results. Note that the volatile storage blank VHBLKA1 contained no target compounds and no tentatively identified compounds.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

The duplicate samples were collected 1 per 20 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: **Yes** [X] **No** [ ]
[(sample - dup)/(0.5*(sample + dup))] * 100 *(Check w/spreadsheet where not lab provided)*
If not, note discrepancies and explain:

For duplicate samples SB4-104(S) and SB4-104(S)-D, no target analytes were detected in either sample, therefore, RPD was not evaluated - all RPDs would be 0.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [X] **No** [ ]
If not, note descrepancies and explain:

Sample SB4-107(D) was designated as the low level matrix spike/matrix spike duplicate sample for the VOA fraction. Matrix spikes were run in accordance with the SOP requirements and all spike recoveries and RPDs were within the QC limits; therefore the results are acceptable.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

The recoveries of all volatile system monitoring compounds were within QC limits for all low level soil samples; therefore, the results are acceptable.

All data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	I/C	**Lab:**	CLP
Area Sampled:	Area 4	**# of samples:**	2
Type of Sampling:	Deep Soil Borings	**# of duplicates:**	0
Analyses Performed:	RAS VOA	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for medium and low level soil volatiles, respectively.

- VBLKCB [SB4-202-8 and MS/MSD] - from data package SDG# EBGP5, Case #24772
- VBLKGB [SB4-201-16] - from data package SDG# EBGM9, Case #24772

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Laboratory method blank VBLKCB contained chloromethane (180 ug/kg) and methylene chloride (300 ug/kg). Laboratory method blank VBLKGB contained methylene chloride (4 ug/kg) and acetone (3 ug/kg). Methylene chloride and/or acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results. Chloromethane is not a common laboratory contaminant. The presence of chloromethane in the sample associated with VBLKCB is flagged as non-detected "U" when the sample results are less than 5 times the blank results. Note that the volatile storage blank VHBLKA1 contained no target compounds and no tentatively identified compounds.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate deep soil boring samples were collected in Area 4. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 174 soil/sediment samples were collected for VOA analysis and 9 duplicates were collected; this satisfies the one per 20 requirement for duplicate collection.

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A **Yes** [-] **No** [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - no duplicate deep soil boring samples were collected in Area 4 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [ ] **No** [X]
If not, note discrepancies and explain:

Sample SB4-202-8 was designated by the laboratory as the medium level matrix spike/matrix spike duplicate sample for the VOA fraction. Matrix spikes were run in accordance with the SOP requirements. The recovery of chlorobenzene was above the QC limit and the RPDs for 1,1-dichloroethene and chlorobenzene were above QC limits. The positive results for these compounds in the unspiked sample are flagged as estimated "J" and non-detected "UJ".

Below note any other issues given in the laboratory results narrative or additional data useability comments:

System monitoring compound recoveries for the VOA fraction were within QC limits; therefore results are acceptable.
All data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	II/A	**Lab:**	CLP
Area Sampled:	Area 7	**# of samples:**	5
Type of Sampling:	Surface Soil	**# of duplicates:**	0
Analyses Performed:	RAS Total Metals/CN	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks = none specified in narrative.

Holding times met? Yes [X] No [ ] If not, explain:

As per lab narrative.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate surface soil samples were collected in Area 7. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 21 soil/sediment samples were collected for total metals and cyanide analysis and 1 duplicate was collected; although this does not exactly satisfy the one per 20 requirement for duplicate collection, it is close. **To be conservative, the lack of the second duplicate sample for total metals/cyanide will be considered a minor data gap.**

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A Yes [-] No [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 *(Check w/spreadsheet where not lab provided)*
If not, note discrepancies and explain:

N/A - no duplicate surface soil samples were collected in Area 7 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: Yes [-] No [-]
If not, note discrepancies and explain:

No samples from the Area 7 surface soil samples were designated as MS/MSD samples. This is not a data gap.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

Based on ICP analysis, all Sb results are estimated "UJ" due to a possible elevated detection limit. Furthermore, the matrix spike recoveries for Mn and Zn are out of control for the samples in this case 24772 and SDG MEAHPH9 (includes all Area 7 surface soil samples); all Mn and Zn results are estimated "J" due to low bias. Finally, the Continuing Calibration Blanks (CCBs) were found to contain Na (65.9 ug/L) and Be (0.3 ug/L); the Be results for SS7-101, SS7-103, SS7-104, and SS7-105 and the Na results for SS7-101 through SS7-105 are estimated "J" due to contamination.

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	II/B	Lab:	CLP
Area Sampled:	Area 7	# of samples:	18
Type of Sampling:	Subsurface Soil	# of duplicates:	0
Analyses Performed:	RAS VOA	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for low level soil volatiles.

- VBLKP2(1) [SB7-103(D), SB7-104(S) thru SB7-107(S), and SB7-104(D) thru SB7-107(D)] - from data package SDG # EBGC1, Case #24750
- VBLKR1 [SB7-108(S)] - from data package SDG # EBGC1, Case #24750
- VBLKQ2 [SB7-108(D)] - from data package SDG # EBGC1, Case #24750
- VBLKP2(2) [SB7-101(S), SB7-101(D), and SB7-102(S)] - from data package SDG # EBGA1, Case #24750
- VBLKP3 [SB7-102(D) and SB7-103(S)] - from data package SDG # EBGA1, Case #24750
- VBLKBB [SB7-109(S)] - from data package SDG # EBGF9, Case #24772
- VBLKBE [SB7-109(D)] - from data package SDG # EBGF9, Case #24772

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Volatile laboratory method blanks VBLKP2(1), VBLKR1, VBLKQ2, VBLKP2(2) and VBLKP3 all contained methylene chloride and acetone; VBLKBB and VBLKBE contain methylene chloride only (see laboratory narratives for levels). Methylene chloride and/or acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate subsurface soil samples were collected in Area 7. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 174 soil/sediment samples were collected for VOA analysis and 9 duplicates were collected; this satisfies the one per 20 requirement for duplicate collection.

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A **Yes** [-] **No** [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - no duplicate subsurface soil samples were collected in Area 7 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [-] **No** [-]

If not, note discrepancies and explain:

None of the Area 7 subsurface soil samples were designated as matrix spike/matrix spike duplicate samples. However, all matrix spikes for associated samples in corresponding data packages were run in accordance with the SOP requirements and all spike recoveries and RPDs for the volatile soil samples were within QC limits. This is not a data gap.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

System monitoring compound recoveries for the VOA fraction were within QC limits; therefore results are acceptable.

All data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	II/C	**Lab:**	CLP
Area Sampled:	Area 7	**# of samples:**	2
Type of Sampling:	Deep Soil Borings	**# of duplicates:**	1
Analyses Performed:	RAS VOA	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = SB7-202-6-D
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for medium level soil volatiles from data package SDG # EBGK9, Case #24772.

- VBLKCX [SB7-201-13]
- VBLKCY [SB7-202-6]
- VBLKCB [SB7-201-13(DL)]
- VBLKCD [SB7-202-6-D]

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Volatile laboratory method blank [associated sample] VBLKCX contained methylene chloride, chloromethane, bromomethane and xylenes (total); VBLKCY contained methylene chloride and chloromethane; VBLKCB contained methylene chloride and chloromethane; and VBLKCD contained methylene chloride. Methylene chloride is a common laboratory contaminant; the presence of methylene chloride in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results. The presence of the laboratory chemicals chloromethane, bromomethane, and xylenes in any sample associated with the blanks noted above is non-detected "U" when the sample results are less than five (5) times the blank contamination and non-detects require no qualification.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

The duplicate samples were collected 1 per 20 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: **Yes** [ ] **No** [X]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

For field duplicate samples SB7-202-6 and SB7-202-6-D, the RPD for all detected target analytes was less than 30% except for the following compounds (see following page for specific RPDs): 1,1,1-trichloroethane, tetrachloroethane, toluene, ethylbenzene, and xylene (total); however, for a couple of the compounds over the limit, the associated result was flagged as estimated "J" in one or both of the samples (see attached RPD Calcs table). Otherwise, these exceedances in RPDs indicate a lack of precision in these results - this is not uncommon with soil matrix samples that tend to be heterogeneous in nature. Note that RPD was not evaluated for the compounds for which the analyte was detected in one sample below the detection limit and not detected in the duplicate sample; this applies to trichloroethene and chlorobenzene. For target compounds which were not detected in either the duplicate sample or corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [-] **No** [-]

If not, note discrepancies and explain:

None of the Area 7 deep soil boring samples were designated as matrix spike/matrix spike duplicate samples. However, all matrix spikes for associated samples in corresponding data packages were run in accordance with the SOP requirements and all spike recoveries and RPDs for the volatile soil samples were within QC limits. This is not a data gap.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

System monitoring compound recoveries for the VOA fraction were within QC limits; therefore results are acceptable.

Volatile mid-level sample SB7-201-13 required dilution because the concentrations of 1,2-dichloroethene (total), 1,1,1-trichloroethane, trichloroethene, ethylbenzene, and xylenes (total) were over the calibration range. For any analyte that exceeded the calibration range in the original sample analysis, the results of the diluted analysis should be considered the sample's analyte concentration.

All data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	II/D	Lab:	CLP
Area Sampled:	Area 7	# of samples:	4
Type of Sampling:	Creek Sediment	# of duplicates:	1
Analyses Performed:	RAS VOA	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = A7CS-1-D
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for low level soil volatiles from data package SDG # EBFY0, Case #24750.

- VBLKM1 [A7CS-1, A7CS-1-D, A7CS-2]
- VBLKM2 [A7CS-4]
- VBLKC2 [A7CS-3]

Holding times met? Yes [X] No [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. All volatile laboratory method blanks VBLKM1, VBLKM2 and VBLKC2 contained methylene chloride and acetone. Methylene chloride and acetone are common laboratory contaminants; the presence of methylene chloride in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results. VBLKM2 also contained 1,2-dichloropropane and VBLKM1 reported on volatile tentatively identified compound (TIC). The presence of 1,2-dichloropropane and TIC in the samples associated with VBLKM1 and VBLKM2 is flagged as non-detected "U" when the sample results are less than five (5) times the blank contamination and non-detects require no qualification.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

The duplicate samples were collected 1 per 20 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: Yes [X] No [ ]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

For field duplicate samples A7CS-1 and A7CS-1-D, the RPD for all detected target analytes was less than 30%. For target compounds which were not detected in either the duplicate sample or the corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: Yes [-] No [-]
If not, note discrepancies and explain:

None of the Area 7 creek sediment samples were designated as matrix spike/matrix spike duplicate samples. However, all matrix spikes for associated samples in corresponding data packages were run in accordance with the SOP requirements and all spike recoveries and RPDs for the volatile soil samples were within QC limits. This is not a data gap.

Below note any other issues given in the laboratory results narrative or additional data seability comments:

The volatile system monitoring compounds were within the QC limits for all samples; therefore results are acceptable.

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	II/E	Lab:	CLP
Area Sampled:	Area 7	# of samples:	3
Type of Sampling:	Surface Water	# of duplicates:	1
Analyses Performed:	RAS VOA	# of blanks:	1

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = A7SW-2-D
Rinsate Blanks = A7SW-1-B
Laboratory Method Blanks [associated samples] for low level water volatiles from data package SDG # EBFZ1, Case #24750.

* VBLKNG [A7SW-1]
* VBLKQS [A7SW-1-B, A7SW-2, A7SW-2-D, and A7SW-3/MS/MSD]

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after *sample collection.*

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Rinsate blank A7SW-1-B was free of all volatile target analytes. The laboratory method blank VBLKNG contained methylene chloride and 3 tentatively identified compounds (TICs) and VBLKQS contained methylene chloride. The sence of methylene chloride, a common laboratory contaminant, in the samples associated with the method nk is qualified as non-detected "U", when the sample result is less than ten (10) times the blank result. The presence of TICs in the samples associated with the method blank, VBLKNG, is qualified as non-detected "U", when the sample result is less than five (5) times the blank result.

Rate of duplicate samples taken (1/10 field surface water samples collected per matrix):

The duplicate samples were collected 1 per 10 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: **Yes** [X] **No** [ ]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

For detected target analytes in duplicate samples A7SW-2 and A7SW-2-D, none of the RPDs exceeded 30%. For target compounds which were not detected in either the duplicate sample or the corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [X] **No** [ ]
If not, note discrepancies and explain:

Sample A7SW-3 was designated as the matrix spike/matrix spike duplicate sample. Matrix spikes were run in accordance with the SOP requirements and all compounds showed recoveries within the quality control range.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

e volatile system monitoring compounds were within the QC limits for all samples; therefore results are acceptable.

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	III/A	**Lab:**	CLP
Area Sampled:	Area 9/10	**# of samples:**	4
Type of Sampling:	Surface Soil	**# of duplicates:**	0
Analyses Performed:	RAS VOA	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for low level soil volatiles from data package SDG # EBGH9, Case #24772.

- **VBLKBD** [SS9/10-101 and SS9/10-102]
- **VBLKBE** [SS9/10-103 and SS9/10-104]

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Laboratory method blank VBLKBE contained methylene chloride. Methylene chloride is a common laboratory contaminant; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than five (5) times the blank results. Method blank VBLKBD was free of all target analytes.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate surface soil samples were collected in Area 9/10. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 174 soil/sediment samples were collected for VOA analysis and 9 duplicates were collected; this satisfies the one per 20 requirement for duplicate collection.

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A **Yes** [-] **No** [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - no duplicate surface soil samples were collected in Area 9/10 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [-] **No** [-]
If not, note discrepancies and explain:

None of the Area 9/10 surface soil samples were designated as matrix spike/matrix spike duplicate samples. However, all matrix spikes for associated samples in corresponding data packages were run in accordance with the SOP requirements. This is not a data gap.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

The system monitoring compounds IS1 bromochloro-methane, IS2 1,4-difluoro-benzene and IS3 Chlorobenzene-D5 (see Table 4 in Appendix B) were out of QC limits for samples SS9/10-103, SS9/10-103RE, SS9/10-104 and SS9/10-104RE. All positve detects in the samples listed should be considered estimated "J" and non-detects should be considered estimated "UJ".

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	III/B	Lab:	CLP
Area Sampled:	Area 9/10	# of samples:	56
Type of Sampling:	Subsurface Soil	# of duplicates:	4
Analyses Performed:	RAS VOA	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = SB9/10-115(S)-D, SB9/10-118(S)-D, SB9/10-123(S)-D and SB9/10-141(S)-D
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for:

low level soil volatiles

- **VBLKBD** [SB9/10-123(S), -123(D), -139(D), -123(S)-D, -132(D), -139(S), -140(D), -142(D), -141(D), -141(S), -141(S)-D] - from data package SDG # EBGP9, Case #24772
- **VBLKGE** [SB9/10--141(S)MS/MSD] - from data package SDG # EBGP9, Case #24772

- **VBLKBC** [SB9/10-115(S)-D] - from data package SDG # EBGK9, Case #24772
- **VBLKGA** [SB9/10-127(S), -127(D), -125(S), -125(D), -129(S), -129(D), -126(S), -126(D)] - from data package SDG # EBGK9, Case #24772
- **VBLKGB(1)** [SB9/10-128(S), -128(D), -121(S), -121(D), -118(S)] - from data package SDG # EBGK9, Case #24772

- **VBLK1** [SB9/10-134(S), -135(S), -135(D), -137(S), -137(D)] - from data package SDG # EBGS0, Case #24830
- **VBLK2** [SB9/10-134(D)/MS/MSD] - from data package SDG # EBGS0, Case #24830

- **VBLKGB(2)** [SB9/10-118(D), -117(S), -117(D), -116(S), -130(S), -120(S), -130(D), -118(S)-D, -119(S), -119(D), -120(D)] - from data package SDG # EBGM9, Case #24750
- **VBLKBE(1)** [SB9/10-116(D)] - from data package SDG # EBGM9, Case #24772
- **VBLKGC** [SB9/10-132(S), -140(S), -142(S)] - from data package SDG # EBGM9, Case #24772

- **VBLKBE(2)** [SB9/10-115(S)] - from data package SDG # EBGH9, Case #24772
- **VBLKBB(1)** [SB9/10-110(S), -110(D), -111(S), -111(D)] - from data package SDG # EBGH9, Case #24772

- **VBLKBY** [SB9/10-101(S), -101(D), -102(S), -102(D)] - from data package SDG # EBGF9, Case #24772
- **VBLKGB(3)** [SB9/10-101(S)RE, -105(S), -105(D)] - from data package SDG # EBGF9, Case #24772
- **VBLKBB(2)** [SB9/10-109(S)] - from data package SDG # EBGF9, Case #24772
- **VBLKGW** [SB9/10-109(D)] - from data package SDG # EBGF9, Case #24772

medium level soil volatiles

- **VBLKCX** [SB9/10-115(D)/MS/MSD] - from data package SDG # EBGK9, Case #24772

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):

-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Volatile laboratory method blank VBLK2 contained no target analytes and no TICs. Volatile laboratory method blanks VBLKGB(1), VBLKGE, VBLKGC, VBLKGB(3) and VBLKGW all contained methylene chloride and acetone; VBLKBD, VBLKBC, VBLKGA, VBLKBE(1), VBLKBE(2), VBLKBB(1), VBLKBB(2) and VBLKBY contained methylene chloride; VBLKGB(2) contained acetone (see laboratory narratives for levels). Methylene chloride and/or acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results. Laboratory blank VBLKCX contains chloromethane, bromomethane and xylenes (total); VBLK1 containted 1,2-dichloroethene (total). The presence of the contaminants other than the mentioned common laboratory contaminantes is flagged as non-detected "U" when the sample results are less than five (5) times the blank contamination; non-detects require no qualification.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

The duplicate samples were collected 1 per 20 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A **Yes [X] No [ ]**

[(sample - dup)/(0.5*(sample + dup))] * 100 *(Check w/spreadsheet where not lab provided)*

If not, note discrepancies and explain:

Four duplicate subsurface soil samples were collected in Area 9/10 for volatile only analysis. Duplicate samples SB9/10-115(S) and SB9/10-115(S)-D had RPDs below 30% for all detected target analytes. Duplicate samples SB9/10-123(S) and SB9/10-123(S)-D and SB9/10-141(S) and SB9/10-141(S)-D had no detected target analytes and so RPD was not evaluated. Note that for SB9/10-118(S) and SB9/10-118(S)-D, RPD was not evaluated for the compounds for which the analyte was detected in one sample below the detection limit and not detected in the duplicate sample. This applies to methylene chloride, 2-butanone and toluene; no other target analytes were detected. For target compounds which were not detected in either the duplicate sample or the corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes [X] No [ ]**

If not, note discrepancies and explain:

Samples SB9/10-141(S), SB9/10-118(S), SB9/10-134(D), and SB9/10-142(S) were designated as low level matrix spike/matrix spike duplicate samples for the VOA fraction. Sample SB9/10-115(D) was designated as the medium level matrix spike/matrix spike duplicate samples for the VOA fraction. Matrix spikes were run in accordance with the SOP requirements and all spike recoveries and RPDs were within the QC limits; therefore the results are acceptable.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

For the VOA fraction (data package SDG#EBGF9, Case#24772), the recoveries of IS1 (1,4-dichlorobenzene-d4), IS2 (naphthalene-d8) and IS3 (acenaphthene-d10) [see Table 4, Appendix B] for SB9/10-101(S)RE were below the QC limits. The recovery for IS3 for SB9/10-101(S) was below the QC limit. The positive results for the target compounds which are associated with the above IS for the above samples are flagged as estimated "J" and non-detected "UJ". The results for SB9/10-101(S) should be used since it had less outstanding QC.

Otherwise, the system monitoring compound recoveries for the VOA fraction were within the QC limits; therefore, the results are acceptable.

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	III/C	Lab:	CLP
Area Sampled:	Area 9/10	# of samples:	22
Type of Sampling:	Subsurface Soil	# of duplicates:	0
Analyses Performed:	RAS VOA	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for:

low level soil volatiles

- **VBLKBY** [SB9/10-103(S)] - from data package SDG # EBGF9, Case #24772
- **VBLKCS** [SB9/10-103(S)RE] - from data package SDG # EBGF9, Case #24772
- **VBLKGW** [SB9/10--103(D), -104(S), -104(D), -107(S), -107(D)] - from data package SDG # EBGF9, Case #24772
- **VBLKBC** [SB9/10-103(D)MS/MSD] - from data package SDG # EBGF9, Case #24772
- **VBLKBB** [SB9/10-108(S), -108(D), -106(S), -106(D)] - from data package SDG # EBGF9, Case #24772

- **VBLKBD** [SB9/10-124(D)] - from data package SDG # EBGP9, Case #24772
- **VBLKBE(1)** [SB9/10-124(S)] - from data package SDG # EBGP9, Case #24772

- **VBLKBE(2)** [SB9/10-112(S), -112(D), -113(S), -113(D)] - from data package SDG # EBGH9, Case #24772

VBLKGB [SB9/10-131(S), -131(D)] - from data package SDG # EBGM9, Case #24772
VBLKGD [SB9/10-122(S)] - from data package SDG # EBGM9, Case #24772
- **VBLKGE** [SB9/10-122(D)] - from data package SDG # EBGM9, Case #24772

- **VBLKGA** [SB9/10-114(S), -114(D)] - from data package SDG # EBGK9, Case #24772

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Volatile laboratory method blanks VBLKGW and VBLKGE all contained methylene chloride and acetone; VBLKBY, VBLKBC, VBLKBB, VBLKBD, VBLKBE(1), VBLKBE(2), and VBLKGA contained methylene chloride; VBLKGB and VBLKGD contained acetone (see laboratory narratives for levels). Methylene chloride and/or acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate subsurface soil samples were collected in Area 9/10 for volatile analysis (coupled with BNA/Pest/PCB). Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 174 soil/sediment samples were collected r volatile analysis and 9 duplicates were collected; this satisfies the one per 20 requirement for duplicate collection.

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A **Yes** [-] **No** [-]

[(sample - dup)/(0.5(sample + dup))] * 100* *(Check w/spreadsheet where not lab provided)*
If not, note discrepancies and explain:

'A - no duplicate subsurface soil samples were collected in Area 9/10 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: Yes [X] No [ ]
If not, note discrepancies and explain:

Sample SB9/10-103(D) was designated as the low level matrix spike/matrix spike duplicate sample for the VOA fraction. Matrix spikes were run in accordance with the SOP requirements and all spike recoveries and RPDs were within the QC limits; therefore the results are acceptable.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

For the VOA fraction of SB9/10-103(S), SB9/10-103(D)MS and SB9/10-103(S)RE, the recoveries of IS1 (1,4-dichloro-benzene-d4), IS2 (naphthalene-d8) and IS3 (acenaphthene-d10) were below QC limits. The positive results for the target compounds which are associated with the above IS for the samples listed are flagged as estimated "J" and non-detected "UJ" (see Table 4, Appendix B for the list of associated compounds for the above IS). Note that the results for SB9/10-103(S) [not SB9/10-103(S)RE] should be used since the reanalysis did not improve the outstanding QC.

Otherwise, system monitoring compound recoveries for the VOA fraction were within the QC limits; therefore, the results are acceptable.

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	III/D	Lab:	CLP
Area Sampled:	Area 9/10	# of samples:	5
Type of Sampling:	Deep Soil Borings	# of duplicates:	0
Analyses Performed:	RAS Total Metals	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks = none specified

Holding times met? Yes [X] No [ ] If not, explain:

As per lab narrative.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. The continuing calibration blank (CCB) associated with SB9/10-203-22 was found to contain Cr (3.2 ug/L); therefore the Cr data for SB9/10-203-22 is estimated "J" due to contamination. The CCB associated with SB9/10-202-18, SB9/10-203-22 and SB9/10-204-21 was found to contain K (405.3 ug/L)and Tl (0.7 ug/L); therefore the K and Tl data for these samples is estimated "J" due to contamination. The CCB associated with SB9/10-204-18 and SB9/10-205-5 was found to contain Tl (3.9 ug/L); therefore the Tl data for these samples is estimated "J" due to contamination. The ICB contained Cd (0.8 ug/L) and Zn (6.1 ug/L); therefore, Cd and Zn results for SB9/10-205-5 is considered estimated "J" due to contamination. The ICB also contained As (1.9 ug/L), Ba (4.7 ug/L), Be (0.9 ug/L) and Co (1.3 /L). All As, Be, Ba and Co data for associated samples SB9/10-204-18 and SB9/10-205-5 are estimated "J" due contamination.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate deep soil boring samples were collected in Area 9/10. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 21 soil/sediment samples were collected for total metals and cyanide analysis and 1 duplicate was collected; although this does not exactly satisfy the one per 20 requirement for duplicate collection, it is close. **To be conservative, the lack of the second duplicate sample for total metals/cyanide will be considered a minor data gap.**

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A Yes [-] No [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - no duplicate deep soil boring samples were collected in Area 9/10 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: Yes [X] No [ ]
If not, note discrepancies and explain:

None of the Area 9/10 surface soil samples were designated as matrix spike/matrix spike duplicate samples. However, the ICP matrix spikes recovery for Sb (69.2%) was out of control; all associated Sb data (samples SB9/10-202-18, SB9/10-203-22 and SB9/10-204-21) are estimated "J" due to low bias. Also, the matrix spike recovery for Ag (46.1%) was out of control; all associated Ag data (samples SB9/10-202-18, SB9/10-203-22 and SB9/10-204-21) are estimated "UJ" due to possible elevation of the detection limit.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	IV/A	**Lab:**	CLP
Area Sampled:	Area 11	**# of samples:**	7
Type of Sampling:	Surface Soil	**# of duplicates:**	0
Analyses Performed:	RAS Total Metals	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks = none specified

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. The continuing calibration blanks (CCBs) were found to contiain Na (65.9 ug/L) and Be (0.3 ug/L). The Be results for SS9/10-101, -102, -103, and -104 and the Na results for SS9/10-101 are estimated "J" due to contamination. In addition the CCB was found to contain Cn (5.1 ug/L). All Cn results except SS9/10-101 are estimated "J" due to contamination.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate surface soil samples were collected in Area 11. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 21 soil/sediment samples were collected for total metals and cyanide analysis and 1 duplicate was collected; although this does not exactly satisfy the one per 20 requirement for duplicate collection, it is close. **To be conservative, the lack of the second duplicate sample for total metals/cyanide will be considered a minor data gap.**

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A **Yes** [-] **No** [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - no duplicate surface soil samples were collected in Area 11 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [-] **No** [-]
If not, note discrepancies and explain:

None of the Area 11 surface soil samples were designated as matrix spike/matrix spike duplicate samples. This is not a data gap. However, the ICP matrix spikes recovery for Sb (69.2%) was out of control; all associated Sb data (samples SB9/10-202-18, SB9/10-203-22 and SB9/10-204-21) are estimated "J" due to low bias. Also, the matrix spike recovery for Ag (46.1%) was out of control; all associated Ag data (samples SB9/10-202-18, SB9/10-203-22 and SB9/10-204-21) are estimated "UJ" due to possible elevation of the detection limit.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

Blank contamination was due to improper decontamination of the field equipment. There is no evidence that the previous sample, or any sample collected in this group of samples, contained enough contamination to create this cross-over contamination result. Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	IV/B	**Lab:**	CLP
Area Sampled:	Area 11	**# of samples:**	26
Type of Sampling:	Subsurface Soil	**# of duplicates:**	1
Analyses Performed:	RAS VOA	**# of blanks:**	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)

Laboratory Method Blanks [associated samples] for low level soil volatiles:

* **VBLKR1** [SB11-101(S), SB11-101(D), SB11-102(S), SB11-103(S), SB11-103(D), and SB11-104(D)] - from data package SDG # EBGC1, Case #24750
* **VBLKR3** [SB11-102(D) and SB11-103(S)MSD] - from data package SDG # EBGC1, Case #24750
* **VBLKQ2** [SB11-104(S) and SB11-103(S)MS] - from data package SDG # EBGC1, Case #24750

* **VBLKGA** [SB11-105(S), SB11-105(D), SB11-106(S), SB11-106(D), SB11-107(S)/MS/MSD, SB11-107(S)-D, SB11-107(D), SB11-108(S), SB11-108(D), SB11-109(S), SB11-109(D), SB11-110(S), and SB11-110(D)] - from data package SDG # EBGE0, Case #24772
* **VBLKGY** [SB11-111(S), SB11-111(D), SB11-112(S), SB11-112(D), SB11-113(S), SB11-113(D)] - from data package SDG # EBGE0, Case #24772

Holding times met? **Yes** [X] **No** [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Volatile laboratory method blanks VBLKR1, VBLKR2, VBLKQ2, and VBLKGA all contained methylene chloride and acetone. Volatile laboratory method blank VBLKGY contained methylene chloride (see laboratory narratives for levels). Methylene chloride and acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

One duplicate subsurface soil sample was collected in Area 11 with 26 investigative samples. This does meet the QC requirements for a rate of 1 duplicate per 20 samples, because the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 174 soil/sediment samples were collected for VOA analysis and 9 duplicates were collected; this satisfies the one per 20 requirement for duplicate collection.

Is Relative Percent Difference (RPD) less than or equal to 30%: **Yes** [X] **No** [ ]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

Duplicate samples SB11-107(S) and SB11-107(S)-D had no detected target analytes and so it was not necessary to evaluate RPD. For target compounds which were not detected in either the duplicate sample or the corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [ ] **No** [X]

If not, note discrepancies and explain:

Sample SB11-112(S) was designated as the matrix spike/matrix spike duplicate samples for the VOA fraction for data package SDG # EBGH9, Case #24772; all MS %recovery were high for all compounds, the MSD %recovery was high for trichloroethene and chlorobenzene, and the %RPD was out for toluene and chlorobenzene. All positive detects in the unspiked sample SB11-112(S) should be considered estimated "J". Sample SB11-103(S) was designated as the matrix spike/matrix spike duplicate samples for the VOA fraction for data package SDG # EBGC1, Case #24750; all spike recoveries and %RPDs for the volatile soil samples were within QC limit; therefore the results are acceptable. All matrix spikes for associated samples in corresponding data packages were run in accordance with the SOP requirements.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

Sample SB11-112(S)MS had IS2 (1,4-difluorobenzene) and IS3 (chlorobenzene-d5) were outside QC limits. Positive detects of the associated compounds should be considered as estimated "J" (see Appendix B, Table 4 for a list of associated compounds).

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	IV/C	Lab:	CLP
Area Sampled:	Area 11	# of samples:	4
Type of Sampling:	Deep Soil Borings	# of duplicates:	0
Analyses Performed:	RAS VOA	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicates = none
Rinsate Blanks = none (as per sampling plan)
Laboratory Method Blanks [associated samples] for low level soil volatiles:

- **VBLKA0** [SB11-201-29 and SB11-201-29] - from data package SDG # EBGR4, Case #24818
- **VBLKCN** [SS11-203-11] - from data package SDG # EBGR4, Case #24818
- **VBLKCP** [SS11-202-9] - from data package SDG # EBGR4, Case #24818
- **VBLKCS** [SS11-203-11MS/MSD] - from data package SDG # EBGR4, Case #24818

Holding times met? Yes [X] No [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Field blanks (rinsate blanks) were not collected for soil matrix samples as per the sampling plan. Volatile laboratory method blank VBLKBD was found to be free of contamination. Low level volatile laboratory method blank VBLKA0 reported a detectable amount of methylene chloride, acetone, toluene and 4 tentatively identified compounds TICs). Methylene chloride and acetone are common laboratory contaminants; the presence of laboratory contaminants in samples associated with these lab method blanks are flagged as non-detected "U" when the sample results are less than ten (10) times the blank results. The presence of toluene and TICs in the samples associated with the method blank VBLKA0 is qualified as non-detected "U" when the sample results are less than five (5) times the blank results. The medium level method blanks VBLKCN, VBLKCP, and VBLKCS were free of all target analytes.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicate deep soil boring samples were collected in Area 11. Note, however, that the sampling plan specifies only that one duplicate soil/sediment matrix sample be collected for every 20 samples collected in the field (not collected per area). Overall, 174 soil/sediment samples were collected for VOA analysis and 9 duplicates were collected; this satisfies the one per 20 requirement for duplicate collection.

Is Relative Percent Difference (RPD) less than or equal to 30%: N/A Yes [-] No [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - no duplicate deep soil boring samples were collected in Area 11 (see explanation above).

MS/MSD Spike recoveries within specified limits (as given by lab)?: Yes [ ] No [X]
If not, note discrepancies and explain:

Sample SB11-203-11 was designated as the matrix spike/matrix spike duplicate samples for the medium level VOA fraction. The MSD %recovery for 1,1-dichloroethene was reported below the QC limit.; the %RPD value for toluene was reported outside of the QC limit; therefore, positive results for 1,1-dichloroethene and the positive results for toluene in the the unspike sample SB11-203-11 are estimated "J" and non-detected results are estimated "UJ". All matrix spikes for associated samples in corresponding data packages were run in accordance with the SOP requirements.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	V	Lab:	CLP
Area Sampled:	Site-wide	# of samples:	5
Type of Sampling:	Groundwater	# of duplicates:	1
Analyses Performed:	RAS VOA	# of blanks:	1

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = MW201-D
Rinsate Blank = MW5B
Trip Blank = TRBLK1
Laboratory Method Blanks [associated samples] for low level water volatiles from data package SDG # EBGT2, Case #24865:

- **VBLKNB** [TRBLK1, MW202, MW203, MW201, MW201-D]
- **VBLKSG** [MW5, MW5B/MS/MSD, and MW4]

Holding times met? Yes [X] No [ ] If not, explain:

As per lab narrative, all volatile analyses were performed within the technical holding time of fourteen (14) days after sample collection.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

Rinsate blank MW5B was free of all volatile target analytes, except for 1,1,1-Trichloroethane at 2 ug/L; this detection is likely due to insufficient decontamination procedures. The laboratory method blank VBLKNB contained methylene chloride, acetone and one (1) tentatively identified compound (TIC). Method blank VBLKSG contained methylene chloride and acetone. The presence of methylene chloride and acetone, common laboratory contaminants, in the samples associated with the method blanks is qualified as non-detected "U", when the sample result is less than ten (10) times the blank result. The presence of TICs in the samples associated with the method blank, VBLKNB, is qualified as non-detected "U", when the sample result is less than five (5) times the blank result. Trip blank TRBLK1 contained no volatile target compounds and one (1) TIC.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

The duplicate samples were collected 1 per 20 for this batch of samples as per the sampling plan.

Is Relative Percent Difference (RPD) less than or equal to 30%: Yes [X] No [ ]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

For detected target analytes in duplicate samples MW201and MW201-D, none of the RPDs exceeded 30%. Note that RPD was not evaluated where an analyte was detected in the first sample below the detection limit of the second sample and then was not detected in the second sample; this is the case for tetrachloroethene only which was detected at 68 ug/L in MW201 and was not detected in MW201-D (detection limit of 620 ug/L). For target compounds which were not detected in either the duplicate sample or the corresponding investigative sample, RPD was not evaluated.

MS/MSD Spike recoveries within specified limits (as given by lab)?: Yes [X] No [ ]
If not, note discrepancies and explain:

Sample MW5B was designated as the matrix spike/matrix spike duplicate sample. Matrix spikes were run in accordance with the SOP requirements and all compounds showed recoveries within the quality control range.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

ote that samples were received at 12 degC instead of 4degC as required by the SOW. As per section 4.2.1 of the SOW, the laboratory informed SMO that the temperature of the samples exceeded 10 degC at the time of receipt. SMO instructed the laboratory to proceed with the analyses and note the temperature deviation in the SDG narrative.

Blank contamination of MW5B was due to improper decontamination of field equipment; therefore, any detection of 1,1,1-Trichloroethane (1,1,1-TCA) at low levels (e.g., 2 ug/L) shall be considered for potential contamination (rather than stricly as an actual detection) - this applies to samples MW202, MW203, MW5, MW4, MW5B. Note that 1,1,1-TCA was detected at MW201 at 12,000 ug/L - this is a true detection which could not have occurred stricly due to equipment contamination.

The volatile system monitoring compounds were within the QC limits for all samples; therefore results are acceptable.

Data is considered useable as reported.

DATA USEABILITY EVALUATION SHEET

Outline #:	VI	Lab:	NET
Area Sampled:	Area 9/10	# of samples:	15
Type of Sampling:	GW Screening	# of duplicates:	0
Analyses Performed:	RAS VOA	# of blanks:	0

ITEMS TO CHECK: (consult case narrative for all below)

Identify field blanks and dups associated with given batch of samples.

Duplicate = none
Rinsate Blank = none
Trip Blank = 2 trip blanks
Laboratory Method Blanks [associated samples] for water volatiles from:
Job #/Sample Batch 96.03373: GW9/10-201-1, -2, -3, -4 + trip blank
Job #/Sample Batch 96.03382: GW9/10-201-5, GW9/10-202-1, -2, -3, -4, -5, -6, GW9/10-203-1, -2, -3 + trip blank
Job #/Sample Batch 96.03399: GW9/10-203-4 + trip blank

Holding times met? **Yes** [X] **No** [ ] If not, explain:

Information received from the National Environmental Testing Inc. (NET) laboratory shows nothing to the contrary of holding times being met. Samples were hand delivered to the laboratory by CDM field personnel, so samples arrived in ample time to be analyzed within holding times.

Notable blank levels for target analytes (those above detection limits):
-- evaluate noted analytes/values in associated samples

three trip blanks were free of volatile target analytes except for two trip blanks (from Job #/Sample Batch 96.03382 and 96.03399) which had detections of methylene chloride (12 ug/L and 21 ug/L, respectively); methylene chloride is a common laboratory contaminant and is often found in laboratory samples. All laboratory quality control blanks were free of all volatile target analytes.

Rate of duplicate samples taken (1/20 field samples collected per matrix):

No duplicates were collected with this group of samples, as per the sampling plan; these samples were collected for screening purposes only.

Is Relative Percent Difference (RPD) less than or equal to 30%: ***N/A*** **Yes** [-] **No** [-]
[(sample - dup)/(0.5*(sample + dup))] * 100 ***(Check w/spreadsheet where not lab provided)***
If not, note discrepancies and explain:

N/A - See explanation given above.

MS/MSD Spike recoveries within specified limits (as given by lab)?: **Yes** [X] **No** [ ]
If not, note discrepancies and explain:

One laboratory MS/MSD sample was run with each of the three batches of samples noted above. All MS/MSD samples had % recoveries and % RPDs well within acceptable QC limits.

Below note any other issues given in the laboratory results narrative or additional data useability comments:

All surrogate recoveries were within QC limits (note that recoveries of 70% to 130% are considered acceptable for QC purposes).

Data is considered useable as reported.

DEFINITIONS OF DATA QUALIFIERS USED IN THE DATA USEABILITY EVALUATION SHEETS AND TEXT

Organic Data Qualifier Definitions

For the purpose of defining the flagging nomenclature utilized in this document the following code letters and associated definitions are provided.

A numerical value will appear if the result is a value greater than or equal to the Contract Required Quantitation Limit (CRQL).

U Indicates that the compound was analyzed for but not detected. The sample quantitation limit corrected for dilution and percent moisture is reported.

J Indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound or when the data indicates the presence of a compound but the result is less than the sample quantitation limit, but greater than zero. The flag is also used to indicate a reported result having an associated QC problem.

R Indicates the data are unusable. (Note: The analyte may or may not be present.)

N Indicates presumptive evidence of a compound. The flag is only used for a tentatively identified compound, where the identification is based on a mass spectral library search.

P Indicates a pesticide/PCB target analyte when there is greater than 25% difference for the detected concentrations between the two GC columns. The lower of the two results is reported.

C Indicates pesticide results that have been confirmed by GC/MS.

B Indicates the analyte is detected in the associated blank as well as the sample.

E Indicates compounds whose concentrations exceed the calibration range of the instrument.

D Indicates an identified compound in an analysis has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.

A Indicates tentatively identified compounds that are suspected to be aldol condensation products.

G Indicates the TCLP Matrix Spike Recovery was greater than the upper limit of the analytical method.

L Indicates the TCLP Matrix spike Recovery was less than the lower limit of the analytical method.

T Indicates the analyte is found in the associated TCLP extraction blank as well as in the sample.

X,Y,Z are reserved for laboratory defined flags.

Inorganic Data Qualifier Definitions

For the purpose of defining the flagging nomenclature utilized in this document the following code letters and associated definitions are provided.

U Indicates the material was analyzed, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J Indicates the associated value is an estimated quantity.

R Indicates the data are unusable. (Note: The analyte may or may not be present.)

UJ Indicates the material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

E Indicates the reported value is estimated because of the presence of interferences. An explanatory note shall be included under Comments on the Cover page(if the problem applies to all samples) or on the specific FORM I-IN (if it is an isolated problem).

M Indicates duplicate injection precision is not met.

N Indicates the spike sample recovery is not within control limits.

S Indicates the reported value was determined by the Method of Standard Addition (MSA).

W Indicates the post-digestion spike for furnace AA analysis is out of control limits (85%-115%), while sample absorbance is less than 50% of the spike absorbance.

+ Indicates the correlation coefficient for the MSA is less than 0.995.

* Indicates the duplicate analysis is not within control limits.

Note: Entering "S", "W" or " + " is mutually exclusive. No combination of these qualifiers can appear in the same field for an analyte.

TABLE

(For Multi-Media, Multi-Concentration Analysis)

VOLATILE INTERNAL STANDARDS WITH CORRESPONDING TCL ANALYTES ASSIGNED FOR QUANTITATION

Bromochloromethane	1,4-Difluorobenzene	Chlorobenzene-d_5
Chloromethane	Bromoform	2-Hexanone
Bromomethane	1,1,1-Trichloroethane	4-Methyl-2-pentanone
Vinyl chloride	Carbon tetrachloride	Tetrachloroethene
Chloroethane	Bromodichloromethane	1,1,2,2-Tetrachloroethane
Methylene chloride	1,2-Dichloropropane	Toluene
Acetone	trans-1,3-Dichloropropene	Chlorobenzene
Carbon disulfide	Trichloroethene	Ethylbenzene
1,1-Dichloroethene	Dibromochloromethane	Styrene
1,1-Dichloroethane	1,1,2-Trichloroethane	Xylene(total)
1,2-Dichloroethene(total)	Benzene	Bromofluorobenzene(surr,smc)
Chloroform	cis-1,3-Dichloropropene	Toluene-d_8(surr,smc)
1,2-Dichloroethane		
1,2-Dichloroethane-d_4(surr,smc)		
2-Butanone		

SEMIVOLATILE INTERNAL STANDARDS WITH CORRESPONDING TCL ANALYTES ASSIGNED FOR QUANTITATION

1,4-Dichlorobenzene-d_4	Naphthalene-d_8	Acenaphthene-d_{10}	Phenanthrene-d_{10}	Chrysene-d_{12}	Perylene-d_{12}
Phenol	Nitrobenzene	Hexachlorocyclopentadiene	4,6-Dinitro-2-methylphenol	Pyrene	Di-n-octyl phthalate
bis(2-chloroethyl)ether	Isophorone	2,4,6-Trichlorophenol	N-nitroso-di-phenylamine	butylbenzyl phthalate	Benzo(b)fluoranthene
2-Chlorophenol	2-Nitrophenol	2,4,5-Trichlorophenol	Carbazole	3,3'-Dichlorobenzidine	Benzo(k)fluoranthene
1,3-Dichlorobenzene	2,4-Dimethylphenol	2-Chloronaphthalene	4-Bromophenyl phenyl ether	Benzo(a)anthracene	Benzo(a)pyrene
1,4-Dichlorobenzene	Naphthalene	2-Nitroaniline	Hexachlorobenzene	bis(2-Ethylhexyl)phthalate	Indeno(1,2,3-cd)pyrene
2,2'-Oxybis-(1-chloropropane)	bis(2-Chloroethoxy)methane	Dimethylphthalate	Pentachlorophenol	Chrysene	Dibenzo(a,h)anthracene
1,2-Dichlorobenzene	2,4-Dichlorophenol	Acenaphthylene	Phenanthrene	Terphenyl-d_{14}(surr)	Benzo(g,h,i)perylene
2-Methylphenol	1,2,4-Trichlorobenzene	3-Nitroaniline	Anthracene		
bis(2-Chloroisopropyl)ether	4-Chloroaniline	Acenaphthene	Di-n-butyl phthalate		
4-Methylphenol	Hexachlorobutadiene	2,4-Dinitrophenol	Fluoranthene		
N-nitroso-di-n-propylamine	4-Chloro-3-methylphenol	4-Nitrophenol			
Hexachloroethane	2-Methylnaphthalene	Dibenzofuran			
2-Fluorophenol(surr)	Nitrobenzene-d_5(surr)	2,4-Dinitrotoluene			
Phenol-d_6(surr)		2,6-Dinitrotoluene			
2-Chlorobenzene-d_4(surr)		Diethyl phthalate			
1,2-Dichlorobenzene-d_4(surr)		4-Chlorophenyl phenyl ether			
		Fluorene			
		4-Nitroaniline			
		2-Fluorobiphenyl(surr)			
		2,4,6-Tribromophenol(surr)			

(surr) - surrogate
(smc) - system monitoring compound

COMPLETENESS AND USEABLE DATA PERCENTAGES

		NUMBER OF SAMPLES				NUMBER OF DUPLICATES				NUMBER OF BLANKS				NUMBER OF MS/MSDs				
SAMPLE MATRIX	ANALYSIS	Planned for Collection[1]	Collected for Analysis	Unuseable Data[2]	Data Gaps[3]	Planned for Collection	Collected for Analysis	Unuseable Data	Data Gaps	Planned for Collection	Collected for Analysis	Unuseable Data	Data Gaps	Planned for Collection	Collected for Analysis	Unuseable Data	Data Gaps	COMPLETENESS[4] (%)
Soil/Sediment	CLP RAS Volatile Organics	193	174	0	0	10	9	0	0	0	0	0	0	10	16	0	0	100%
	CLP RAS BNA Extractables	112	74	0	0	7	6	0	0	0	0	0	0	6	7	0	0	100%
	CLP RAS Pesticides/PCBs	112	74	0	0	7	6	0	0	0	0	0	0	6	7	0	0	100%
	CLP RAS Metals and Cyanide	32	21	0	0	2	1	0	1	0	0	0	0	2	3	0	0	100%
Water	CLP RAS Volatile Organics	3	8	0	0	1	2	0	0	1	2	0	0	1	1	0	0	100%
	CLP RAS BNA Extractables	3	3	0	0	1	1	0	0	1	1	0	0	1	1	0	0	100%
	CLP RAS Pesticides/PCBs	3	3	0	0	1	1	0	0	1	1	0	0	1	1	0	0	100%
Soil Gas	Volatile Organics	248	216	0	0	0	0	0	0	100	84	0	16	0	0	0	0	100%
TOTALS ---------->		*706*	*573*	*0*	*0*	*29*	*26*	*0*	*1*	*103*	*88*	*0*	*16*	*27*	*36*	*0*	*0*	

1) In all cases in which fewer samples were collected than were planned, the samples were unable to be collected due to conditions encountered in the field or that were determined in the field to be unnecessary (i.e., all contingency samples were not collected). These are not data gaps.

[5] USEABLE DATA: 98%

2) Unuseable data is data that the laboratory deemed unuseable *AND* that is among the contaminants of concern for the given sampling area.

3) Data gaps generally describe QC or investigative samples that were inadvertantly not collected during the sampling event. This includes usually includes field duplicates, rinsate blanks, and MS/MSDs.

4) Completeness (%) =
[(number of useable data)/(number of samples collected and submitted to the laboratory for each parameter analyzed)] x 100
Completeness describes the percentage of the data received from the lab that was useable compared to the data we expected from the lab for all samples submitted.

5) Useable Data (%) =
[(number of data collected for analysis) - (number of unuseable data + number of data gaps)/(number of data collected for analysis)] x 100
Useable Data is the data that can be used to perform the Risk Assessment and Feasibility Study.

NOTE THAT IN CASES IN WHICH ONLY ONE ANALYTE OF A RESULT IS UNUSEABLE, THE NUMBER OF "UNUSEABLE DATA" WAS ROUNDED UP TO THE NEAREST WHOLE NUMBER TO MAKE THE MOST CONSERVATIVE ESTIMATE OF COMPLETENESS (%) AND USEABLE DATA.

LIST OF ACRONYMS

Acronyms

BNA	Base Neutral Acid (semivolatile and PAH analyte group)
CCB	Continuing Calibration Blank
CDM	Camp Dresser & McKee Inc.
cis-1, DCE	cis-1, 2-dichloroethene
CLP	Contract Laboratory Program
DQO	Data Quality Objectives
FID	Flame Ionization Detector
GC	Gas Chromatography
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NET	National Environmental Testing, Inc.
OVA	Organic Vapor Analyzer
OVM	Organic Vapor Meter
PCB	Polychorinated Biphenyls
PID	Photoionization Detector
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAS	Routine Analytical Services
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference

SAP	Sampling and Analysis Plan
SCOU	Source Control Operable Unit
SOP	Standard Operating Procedure
TCE	trichloroethene
trans-1,2-DCE	trans-1,2-dichloroethene
U.S. EPA	United States Environmental Protection Agency
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

Appendix B

APPENDIX B
AREA 4 DATA
JULY 2000

Sample ID	SG4-101	SG4-102	SG4-103	SG4-104	SG4-105	SG4-106	SG4-107	SG4-108	SG4-109	SG4-110	SG4-111	SG4-112	SG4-113	SG4-114	SG4-115	SG4-116	SG4-117	SG4-118	SG4-119
Compound																			
Benzene	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 2	3	< 5	2
Toluene	10	7	5	7	11	8	12	14	8	15	19	17	22	16	26	22	30	19	46
Ethylbenzene	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	6	< 2	8	5	< 5	< 2	11	5	17
Xylene isomer	< 6	< 6	< 6	< 6	< 6	< 6	< 6	7	< 6	7	16	< 6	28	14	< 15	17	32	< 15	53
Total BTEX	< 20	< 17	< 15	< 17	< 21	< 18	< 22	< 25	< 18	< 26	< 43	< 27	< 60	< 37	< 51	< 43	76	< 44	118
Vinyl Chloride	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 2	* 160	< 5	< 2
Trans-1,2-Dichloroethene	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 2	* 160	< 5	< 2
1,1-Dichloroethane	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	5	< 2	270	< 5	23
Cis-1,2 Dichloroethene	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 2	< 2	< 5	< 2
1,1,1-Trichloroethane	4	41	31	68	39	14	21	3	20	< 2	49	5	** 300	24	** 830	41	** 7200	41	** 2900
Trichloroethene	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 2	480	< 5	160
Tetrachloroethene	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	< 5	< 2	6	< 5	5
Total VOCs	< 16	< 53	< 43	< 80	< 51	< 26	< 33	< 15	< 32	< 14	< 61	< 17	< 312	< 36	< 860	< 53	< 8278	< 71	< 3094
TOTAL 1,2-DCE	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 10	< 4	< 162	< 10	< 4

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG4-120	SG4-121	SG4-122	SG4-123	SG4-124	SG4-125	SG4-126	SG4-127	SG4-128	SG4-129	SG4-130	SG4-131	SG4-132	SG4-133	SG4-134	SG4-135
Compound																
Benzene	< 2	< 10	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	11	4
Toluene	22	60	14	36	15	** 290	23	4	8	11	17	18	18	4	11	6
Ethylbenzene	9	< 10	6	13	6	< 10	9	< 2	3	5	8	9	7	< 2	4	6
Xylene isomer	16	< 30	12	50	14	120	20	< 6	9	13	15	33	19	< 2	6	7
Total BTEX	< 49	< 110	< 34	< 109	< 37	< 430	< 54	< 14	< 22	< 31	< 42	< 62	< 46	< 10	32	23
Vinyl Chloride	< 2	< 10	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1	< 1
Trans-1,2-Dichloroethene	< 2	< 10	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	13	< 1
1,1-Dichloroethane	< 2	24	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	45	< 1
Cis-1,2 Dichloroethene	< 2	< 10	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1	< 1
1,1,1-Trichloroethane	18	** 1900	9	200	3	** 300	< 2	< 2	< 2	< 2	< 2	< 2	17	< 2	< 1	< 1
Trichloroethene	< 2	90	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1	< 1
Tetrachloroethene	< 2	11	< 2	< 10	< 2	< 10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	7	4
Total VOCs	< 30	< 2055	< 21	< 260	< 15	< 360	< 14	< 14	< 14	< 14	< 14	< 14	< 29	< 14	< 69	< 10
TOTAL 1,2-DCE	< 4	< 20	< 4	< 20	< 4	< 20	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 14	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 4

Date Sampled	06/12/96	06/12/96	06/12/96	06/27/96	06/12/96	06/12/96	06/12/96	06/12/96	06/12/96	06/27/96
Sample Number	SB4-105(S)	SB4-102(S)	SB4-102(D)	SB4-201-16	SB4-104(S)	SB4-104(S)-D	SB4-106(S)	SB4-107(S)	SB4-107(D)	SB4-202-8
Organic Traffic Report Number	EBGB0	EBGA3	EBGA4	EBGP1	EBGA7	EBGA8	EBGB2	EBGB4	EBGB5	EBGR3
Volatile Organics (ug/Kg)										
Methylene Chloride	10 JBU	10 JBU	10 JBU	4 J	10 JBU	10 JBU	11 JBU	13 JBU	16 BU	27000 BJU
1,1,1-Trichloroethane	10 U	10 U	10 U	2 J	10 U	10 U	11 U	13 U	13 U	510000

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 4

Date Sampled	06/12/96	06/12/96	06/12/96	06/12/96	06/13/96	06/12/96	06/12/96
Sample Number	SB4-104(D)	SB4-103(S)	SB4-101(S)	SB4-105(D)	SB4-106(D)	SB4-101(D)	SB4-103(D)
Organic Traffic Report Number	EBGA9	EBGA5	EBGA1	EBGB1	EBGB3	EBGA2	EBGA6
Volatile Organics (ug/Kg)							
Methylene Chloride	10 JBU	12 BU	10 JBU	10 JBU	10 JBU	15 BU	10 JBU
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U	12 U	10 U

Southeast Rockford Hits Table - Organic Surface Soil Analysis - Area 4

Date Sampled	06/10/96	06/10/96	06/10/96	06/10/96	06/10/96	06/10/96
Sample Number	SS4-205	SS4-201	SS4-203-D	SS4-204	SS4-203	SS4-202
Organic Traffic Report Number	EBFY5	EBFY0	EBFY2	EBFY4	EBFY3	EBFY1
Volatile Organics (ug/Kg)						
1,2-Dichloropropane	2 J	12 U	1 J	12 U	12 U	12 U
Semivolatile Organics (ug/Kg)						
Naphthalene	400 U	49 J	260 J	380 U	210 J	400 U
2-Methylnaphthalene	400 U	58 J	120 J	380 U	110 J	400 U
Acenaphthene	400 U	400 U	960	380 U	850	400 U
Dibenzofuran	400 U	400 U	550	380 U	420	400 U
Fluorene	400 U	400 U	920	380 U	720	400 U
Phenanthrene	400 U	570	16000 D	380 U	8600 D	420
Anthracene	400 U	72 J	1000	380 U	960	50 J
Carbazole	400 U	78 J	1400	380 U	1100	48 J
Di-n-Butylphthalate	100 J	66 J	72 J	380 U	51 J	57 J
Fluoranthene	81 J	1100	12000 D	44 J	11000 D	790
Pyrene	400 U	640	4700 D	45 J	5000 D	290 J
Butylbenzylphthalate	400 U	130 J	180 J	380 U	60 J	400 U
Benzo(a)anthracene	53 J	420	5600 D	380 U	4700 D	330 J
Chrysene	72 J	580	5900 D	380 U	5200 D	400
bis(2-Ethylhexyl)Phthalate	300 J	9000 D	320 J	330 J	300 J	1200
Di-n-Octyl Phthalate	400 UJ	67 J	400 UJ	380 UJ	390 U	400 UJ
Benzo (b) Fluoranthene	150 XJ	1200 XJ	11000 DXJ	67 XJ	9600 DX	640 X
nzo (k) Fluoranthene	160 XJ	1300 XJ	11000 DXJ	70 XJ	9900 DX	670 X
enzo (a) Pyrene	400 U	160 J	860 J	380 U	1100	97 J
Ideno (1,2,3-cd) Pyrene	400 U	79 J	500 J	380 U	620	75 J
Dibenzo (a,h) Anthracene	400 U	41 J	430 J	380 U	390 J	52 J
Benzo (g,h,i) Perylene	400 UJ	400 UJ	56 J	380 UJ	70 J	400 UJ
Pesticides & PCBs (ug/Kg)						
delta-BHC	2 U	0.29 JP	2.1 U	0.068 UJ	0.095 JP	0.29 JP
Aldrin	0.39 JP	2 U	2.1 U	2 UJ	0.29 JP	2 U
Heptachlor epoxide	2 U	0.52 JP	2.1 U	2 UJ	2 UJ	0.7 J
Endosulfan I	2 U	2 U	0.13 JP	2 UJ	2 UJ	2 U
Dieldrin	0.53 J	3.8 J	0.29 JP	3.8 UJ	0.98 JP	3.9 J
4,4'-DDE	0.84 J	1.3 JP	4 U	3.8 UJ	3.9 UJ	0.83 J
Endrin	4 U	4 U	4 U	3.8 UJ	0.61 JP	4 U
Endosulfan II	4 U	0.4 JP	0.35 JP	3.8 UJ	0.2 JP	4 U
4,4'-DDD	0.45 JP	0.96 JP	1.9 J	3.8 UJ	0.95 JP	0.13 JP
4,4'-DDT	3.7 JP	18 P	4 U	3.8 UJ	3.9 UJ	4 U
Methoxychlor	1.2 JP	20 J	26 P	20 UJ	21 PJ	5.2 JP
Endrin ketone	0.34 JP	4 U	4 U	3.8 UJ	3.9 UJ	0.3 JP
Endrin aldehyde	0.33 J	1 JP	4 U	3.8 UJ	3.9 UJ	0.61 JP
alpha-Chlordane	0.21 JP	3.4 P	0.27 JP	2 UJ	0.2 JP	2 JP
gamma-Chlordane	2 U	1.1 JP	2.1 U	2 UJ	2 UJ	2 U
Aroclor-1254	8.4 JP	49 P	30 JP	38 U	39 U	36 JP

Southeast Rockford Hits Table - Inorganic Surface Soil Sample Analysis - Area 4

Date Sampled	06/10/96	06/10/96	06/10/96	06/10/96	06/10/96	06/10/96
Sample Number	SS4-201	SS4-202	SS4-203-D	SS4-203	SS4-204	SS4-205
Inorganic Traffic Report Number	MEAPB0	MEAPB1	MEAPB2	MEAPB3	MEAPB4	MEAPB5
Inorganics (mg/Kg)						
Aluminum	4330 *J	8860 *J	2550 *J	3860 *J	6360 *J	8330 *J
Arsenic	3	5.5	2.8	2.8	3.9	6.2
Barium	59.7	119	27 B	31.6 B	92	113
Beryllium	0.39 B	0.56 B	0.35 B	0.7 B	0.44 B	0.58 B
Cadmium	1.2	1.1 B	0.53 B	0.46 B	0.23 U	0.43 B
Calcium	37500 *J	11100 *J	131000 *J	87600 *J	2590 *J	4700 *J
Chromium	12.6	15.4	5.4	6.7	10.2	13.5
Cobalt	3 B	6.2 B	2.9 B	2.8 B	4.9 B	6 B
Copper	22.9	148	10.2	13.2	7.8	14.1
Iron	11400 *J	13600 *J	7390 *J	13000 *J	10000 *J	13500 *J
Lead	112	102	25.1	20.3	15.1	39.1
Magnesium	19100 *J	6560 *J	83700 *J	54500 *J	1530 *J	2690 *J
Manganese	489 NJ	592 NJ	313 NJ	264 NJ	477 NJ	572 NJ
Nickel	8.7 B	13.8	7.2 B	6.8 B	8 B	11.5
Potassium	600 B	808 B	296 B	388 B	426 B	856 B
Selenium	0.92 BNJ	1.1 BNJ	0.72 UN	0.74 UN	1.1 BNJ	0.73 UN
Sodium	279 B	93.4 B	141 B	223 B	87.5 B	70.8 B
Thallium	1.4 B	2.4 B	1.5 B	1.6 B	1.3 B	1.7 B
Vanadium	10.7 B	23.2	9.9 B	12.5	21.1	26.1
Zinc	742	645	89.8	89.9	34	64.9
anide	0.35 B	0.46 B	0.12 U	0.12 U	0.12 U	0.23 B

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BOREHOLE LOG
SB4-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 735
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 81
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 31
Drilling Date: Start 6/29/96 **End** 6/29/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed E Not Surveyed
Logged By: SNEHAL S. BHAGAT

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev./ Depth (ft.)	Graphic Log	Material Description
					735.0 0		0'-0.2': ASPHALT;
							0.2'-0.8': Graded limestone FILL;
SS	SB4-201-001	3.0	14"/24"	2;3; 3;3;			0.8'-2.6': Brown gravelly SAND; dry; traces of dark brown, med. sand;
SS	SB4-201-002	6.4	12"/24"	4;3; 3;3;			2.6'-24.8': Brown, well sorted, med. SAND; dry;
SS	SB4-201-003	9.8	3"/24"	WOH;WOH WOH;1;	730.0 5		Note that possible "void" was encountered from 5'-7';
SS	SB4-201-004	7.2	14"/24"	WOH;3; 5;7;			
SS	SB4-201-005	10	18/24"	5;5; 6;6;	725.0 10		
SS	SB4-201-006	1.0	18"/24"	3;5; 7;11;			
SS	SB4-201-007	1.0	14"/24"	3;5; 8;9;			
SS	SB4-201-008	1.6	20"/24"	6;8; 10;13;	720.0 15		
SS	SB4-201-009	1.5	18"/24"	7;10; 12;14;			
SS	SB4-201-010	1.2	20"/24"	4;7; 11;11;	715.0 20		
SS	SB4-201-011	0.6	19"/24"	6;9; 13;14;			
SS	SB4-201-012	3.8	20"/24"	5;9; 12;12;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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BOREHOLE LOG
SB4-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1881-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB4-201-013	14	21"/24"	2;9; 12;14;			24.8'-28.8': Brown, well sorted, med. to coarse SAND; moist starting at 26.8';
SS	SB4-201-014	11	18"/24"	7;3; 5;9;			
SS	SB4-201-015	8.8	14"/24"	3;6; 9;10;	705.0 30		28.8'-44.6': *Brown, well sorted, coarse SAND; saturated at 31';* Saturated at 31'; w/trace gravel from 32.4'-44.6';
SS	SB4-201-016	9.2	10"/24"	3;3; 3;4;			
SS	SB4-201-017	8.1	10"/24"	5;2; 7;14;			
SS	SB4-201-018	4.6	14"/24"	10;12; 15;19;	700.0 35		
SS	SB4-201-019	5.3	18"/24"	11;13; 19;16;			
SS	SB4-201-020	2.3	18"/24"	15;17; 19;19;	695.0 40		
SS	SB4-201-021	3.1	12"/24"	7;9; 10;12;			
SS	SB4-201-022	7.0	14"/24"	10;7; 18;18;			
SS	SB4-201-023	7.4	4"/24"	10;7; 8;8;	690.0 45		44.6'-54.5': Brown, coarse SAND and GRAVEL;
SS	SB4-201-024	4.4	10"/24"	4;7; 9;9;			
SS	SB4-201-025	2.7	12"/24"	7;12; 17;17;	685.0 50		
SS	SB4-201-026	3.1	10"/24"	12;12; 9;9;			
SS	SB4-201-027	3.5	12"/24"	9;8; 17;22;			
SS	SB4-201-028	4.2	14"/24"	5;7; 18;10;	680.0 55		54.5'-56.6': Brown, sandy GRAVEL;
SS	SB4-201-029	7.9	15"/24"	7;17; 27;32;			56.6'-62.3': Brown, well sorted, fine SAND;
SS	SB4-201-030	7.5	17"/24"	14;26; 34;35;	675.0 60		
SS	SB4-201-031	4.8	20"/24"	25;30; 33;18;			
SS	SB4-201-032	6.4	18"/24"	11;16; 24;27;			62.3'-81.0': Gray CLAY; plastic and massive; orange-brown CLAY observed 62.3'-62.6';

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BOREHOLE LOG
SB4-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB4-201-033	5.0	18"/24"	20;25; 24;29;			
SS	SB4-201-034	1.6	24"/24"	8;12; 13;18;			
SS	SB4-201-035	1.2	24"/24"	10;11; 14;30;	665.0 / 70		Silty CLAY observed 71.0'-72.5';
SS	SB4-201-036	1.9	18"/24"	7;21; 28;25;			Dark reddish brown CLAY observed 73.0'-73.3';
SS	SB4-201-037	2.4	24"/24"	6;6; 10;14;	660.0 / 75		
SS	SB4-201-038	1.1	24"/24"	7;14; 16;16;			
SS	SB4-201-039	0.9	24"/24"	9;12; 16;18;			
SS	SB4-201-040	0.8	24"/24"	11;17; 22;25;	655.0 / 80		
							81': Bottom of Boring
					650.0 / 85		
					645.0 / 90		
					640.0 / 95		
					635.0 / 100		

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BOREHOLE LOG
SB4-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1881-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 735
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 65
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 28.8
Drilling Date: Start 6/27/96 **End** 6/27/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: SNEHAL S. BHAGAT

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					735.0 0		0'-0.3': ASPHALT 0.3'-0.8': Crushed limestone FILL; 0.8'-6.2': Dark reddish brown, well sorted, med. SAND; dry;
SS	SB4-202-001	40	16"/24"	2;1; 1;1;	730.0 5		
							6.2'-28.7': Tan to tan/brown, well sorted, med. SAND; dry to 23'; dry/slightly moist to 27';
SS	SB4-202-002	52	18"/24"	4;5; 8;10;	725.0 10		
SS	SB4-202-003	42	17"/24"	2;5; 5;9;	720.0 15		
SS	SB4-202-004	71	18"/24"	4;6; 7;11;	715.0 20		
SS	SB4-202-005	310	15"/24"	2;4; 8;6;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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BOREHOLE LOG
SB4-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB4-202-006	120	18"/24"	4;5; 8;9;			Note: Samples SB4-202-007 to -011 tested positive for NAPL using Sudan IV dye; samples -012 and -013 tested negative;
SS	SB4-202-007	>1000	20"/24"	4;8; 8;9;			
SS	SB4-202-008	>1000	17"/24"	2;3; 9;7;	705.0 30		28.7'-30.7': Tan and gray, well sorted med. and coarse SAND; solvent-like odor; saturated at approximately 28.8';
SS	SB4-202-009	>1000	12"/24"	3;7; 10;12;			30.7'-36.5': Gray to dark gray, well sorted, med. to coarse SAND; solvent-like odor;
SS	SB4-202-010	190	15"/24"	5;8; 12;11;			
SS	SB4-202-011	160	12"/24"	6;8; 12;12;	700.0 35		
SS	SB4-202-012	40	15"/24"	6;6; 8;11;			36.5'-42.6': Brown, well sorted, coarse SAND; some gravel;
SS	SB4-202-013	16	13"/24"	9;13; 14;14;	695.0 40		
SS	SB4-202-014	36	15"/24"	8;13; 20;18;			
SS	SB4-202-015	35	17"/24"	9;10; 13;18;			42.6'-46.6': Brown, gravelly, coarse SAND;
SS	SB4-202-016	38	14"/24"	11;15; 16;16;	690.0 45		
SS	SB4-202-017	18	13"/24"	11;19; 19;18;			46.6'-48.6': Brown SAND and GRAVEL;
SS	SB4-202-018	16	16"/24"	9;14; 14;14;	685.0 50		48.6'-54.6': Brown, med. to coarse SAND;
SS	SB4-202-019	14	15"/24"	10;10; 13;16;			
SS	SB4-202-020	28	15"/24"	7;11; 17;19;			
SS	SB4-202-021	25	12"/24"	13;16; 90/6"	680.0 55		54.6'-56.8': Brown GRAVEL;
SS	SB4-202-022	12	14"/24"	11;14; 15;10;			56.8'-58.6': Brown SAND and GRAVEL;
SS	SB4-202-023	12	17"/24"	15;22; 30;20;	675.0 60		58.6'-61.8': Brown, well sorted, fine SAND;
SS	SB4-202-024	5.8	19"/24"	11;18; 15;13;			61.8'-62.6': Brown CLAY;
SS	SB4-202-025	3.2	17"/24"	8;10; 16;17;			62.6'-64.4': Gray CLAY; plastic; 65': Bottom of Boring

Appendix C

APPENDIX C
AREA 7 DATA
JULY 2000

Sample ID	SG7-101	SG7-102	SG7-103	SG7-104	SG7-105	SG7-106	SG7-107	SG7-108	SG7-109	SG7-110	SG7-111	SG7-112	SG7-113
Compound													
Benzene	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	3	NC	< 2	< 2
Toluene	16	130	NC	NC	NC	NC	NC	NC	NC	17	NC	79	110
Ethylbenzene	6	38	NC	NC	NC	NC	NC	NC	NC	4	NC	28	36
Xylene isomer	29	140	NC	NC	NC	NC	NC	NC	NC	6	NC	200	120
Total BTEX	< 53	< 310	NC	NC	NC	NC	NC	NC	NC	< 30	NC	< 309	< 268
Vinyl Chloride	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	9	NC	< 2	< 2
Trans-1,2-Dichloroethene	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	6	NC	< 2	< 2
1,1-Dichloroethane	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	99	NC	< 2	< 2
Cis-1,2 Dichloroethene	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	** 200	NC	< 2	< 2
1,1,1-Trichloroethane	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	** 850	NC	4	< 2
Trichloroethene	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	4	NC	< 2	< 2
Tetrachloroethene	< 2	< 2	NC	NC	NC	NC	NC	NC	NC	67	NC	< 2	< 2
Total VOCs	< 14	< 14	NC	NC	NC	NC	NC	NC	NC	** 1235	NC	< 16	< 14
TOTAL 1,2-DCE	< 4	< 4	NC	NC	NC	NC	NC	NC	NC	< 206	NC	< 4	< 4

NC Not Collected; refer to headspace data

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG7-114	SG7-115	SG7-116	SG7-117	SG7-118	SG7-119	SG7-120	SG7-121	SG7-122	SG7-123	SG7-124	SG7-125	SG7-126
Compound													
Benzene	NC	NC	NC	NC	NC	NC	NC	NC	12	6	< 1	< 1	< 1
Toluene	NC	NC	NC	NC	NC	NC	NC	NC	69	< 1	** 380	3	4
Ethylbenzene	NC	NC	NC	NC	NC	NC	NC	NC	11	15	< 1	3	3
Xylene isomer	NC	NC	NC	NC	NC	NC	NC	NC	23	39	< 3	10	10
Total BTEX	NC	NC	NC	NC	NC	NC	NC	NC	115	< 61	**< 385	< 17	< 18
Vinyl Chloride	NC	NC	NC	NC	NC	NC	NC	NC	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	NC	NC	NC	NC	NC	NC	NC	NC	< 1	2	** 3800	< 1	< 1
1,1-Dichloroethane	NC	NC	NC	NC	NC	NC	NC	NC	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	NC	NC	NC	NC	NC	NC	NC	NC	< 1	15	** 230	< 1	< 1
1,1,1-Trichloroethane	NC	NC	NC	NC	NC	NC	NC	NC	< 1	< 1	120	< 1	15
Trichloroethene	NC	NC	NC	NC	NC	NC	NC	NC	< 1	< 1	14	< 1	1
Tetrachloroethene	NC	NC	NC	NC	NC	NC	NC	NC	< 1	< 1	13	< 1	< 1
Total VOCs	NC	NC	NC	NC	NC	NC	NC	NC	< 7	< 22	**< 4179	< 7	< 21
TOTAL 1,2-DCE	NC	NC	NC	NC	NC	NC	NC	NC	< 2	< 17	< 4030	< 2	< 2

NC Not Collected; refer to

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

	Concentration (ppm)															
Sample ID	HS7-103	HS7-104	HS7-105	HS7-106	HS7-107	HS7-108	HS7-109	HS7-111	HS7-114	HS7-115	HS7-116	HS7-117	HS7-118	HS7-119	HS7-120	HS7-121
Total VOCs	0	0	0	0.2	10	280	0	460	0.1	20	6.6	0.3	0	0.3	0.8	1.4

All headspace measurements made with an organic vapor analyzer, OVA Model 128GC

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 7

Date Sampled	06/13/96	06/13/96	06/13/96	06/13/96	06/13/96	06/13/96	06/13/96	06/13/96	06/13/96	06/13/96
Sample Number	SB7-103(S)	SB7-106(D)	SB7-103(D)	SB7-104(S)	SB7-104(D)	SB7-105(S)	SB7-105(D)	SB7-106(S)	SB7-107(S)	SB7-107(D)
Organic Traffic Report Number	EBGC0	EBGC7	EBGC1	EBGC2	EBGC3	EBGC4	EBGC5	EBGC6	EBGC8	EBGC9
Volatile Organics (ug/Kg)										
1,1-Dichloroethene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
1,1-Dichloroethane	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
1,2-Dichloroethene (total)	4 J	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	21
Chloroform	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
1,1,1-Trichloroethane	1 J	11 U	11 U	11 U	11 U	2 J	1 J	11 U	11 U	40
Trichloroethene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
1,1,2-Trichloroethane	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
Benzene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
4-Methyl-2-Pentanone	11 U	11 UJ	11 UJ	11 UJ	11 UJ	11 UJ	11 UJ	11 UJ	11 UJ	9 J
Tetrachloroethene	11 U	11 U	11 U	11 U	11 U	1 J	11 U	11 U	3 J	12 U
Toluene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	3 J
Chlorobenzene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U
Ethylbenzene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	5 J
Xylene	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	40

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 7

Date Sampled	06/14/96	06/21/96	06/21/96	06/14/96	06/13/96	06/13/96	06/13/96	06/13/96	06/25/96	06/25/96
Sample Number	SB7-108(D)	SB7-109(S)	SB7-109(D)	SB7-108(S)	SB7-101(S)	SB7-101(D)	SB7-102(S)	SB7-102(D)	SB7-201-13	SB7-202-6
Organic Traffic Report Number	EBGD9	EBGH7	EBGH8	EBGD8	EBGB6	EBGB7	EBGB8	EBGB9	EBGL9	EBGM0
Volatile Organics (ug/Kg)										
1,1-Dichloroethene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1300	1400 U
1,1-Dichloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	2900	1400 U
1,2-Dichloroethene (total)	11 U	11 U	12 U	11 U	11 U	11 U	11 U	7 J	47000 D	1400 U
Chloroform	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	570 J	1400 U
1,1,1-Trichloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	2 J	460000 D	1100 J
Trichloroethene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	96000 D	240 J
1,1,2-Trichloroethane	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	460 J	1400 U
Benzene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	220 J	1400 U
4-Methyl-2-Pentanone	11 UJ	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1300 U	1400 U
Tetrachloroethene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	23000	1100 J
Toluene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	23000	7500
Chlorobenzene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	1300 U	1600
Ethylbenzene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	31000 D	13000
Xylene	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	190000 D	57000

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 7

Date Sampled	06/26/96
Sample Number	SB7-202-6-D
Organic Traffic Report Number	EBGM1

Volatile Organics (ug/Kg)

1,1-Dichloroethene	13000	U
1,1-Dichloroethane	13000	U
1,2-Dichloroethene (total)	13000	U
Chloroform	13000	U
1,1,1-Trichloroethane	1600	J
Trichloroethene	13000	U
1,1,2-Trichloroethane	13000	U
Benzene	13000	U
4-Methyl-2-Pentanone	13000	U
Tetrachloroethene	2500	J
Toluene	14000	
Chlorobenzene	13000	U
Ethylbenzene	28000	
Xylene	140000	

Southeast Rockford Hits Table - Organic Surface Soil Analysis - Area 7

Date Sampled	06/21/96	06/21/96	06/21/96	06/21/96	06/21/96
Sample Number	SS7-105	SS7-102	SS7-103	SS7-104	SS7-101
Organic Traffic Report Number	EBGH9	EBGJ0	EBGJ1	EBGJ2	EBGJ3
Volatile Organics (ug/Kg)					
1,1,1-Trichloroethane	12 U	5 J	12 U	11 U	12 U
Toluene	12 U	12 UJ	12 U	1 J	12 U
Semivolatile Organics (ug/Kg)					
bis(2-Ethylhexyl)Phthalate	46 J	77 J	49 J	70 J	53 J
Pesticides & PCBs (ug/Kg)					
No Hits					

Southeast Rockford Hits Table - Inorganic Surface Soil Sample Analysis - Area7

Date Sampled	06/21/96	06/21/96	06/21/96	06/21/96	06/21/96
Sample Number	SS7-102	SS7-103	SS7-104	SS7-101	SS7-105
Inorganic Traffic Report Number	MEAPJ0	MEAPJ1	MEAPJ2	MEAPJ3	MEAPH9
Inorganics (mg/Kg)					
Aluminum	15000	9030	9980	8630	9270
Arsenic	6.8	4.3	4.4	3.6	3.9
Barium	114	67.6	61.2	56.7	41.6 B
Beryllium	0.66 B	0.15 BJ	0.22 BJ	0.13 BJ	0.15 BJ
Calcium	2300	1560	9400	929 B	8540
Chromium	17.8	11.1	11.4	10.1	10.5
Cobalt	9.2 B	5.6 B	6.1 B	5.4 B	5.2 B
Copper	15.3	8.2	9.9	7.6	11.6
Iron	19200	11800	13500	10600	11800
Lead	22.3	12.9	10.9	12.6	14.4
Magnesium	2630	1530	6130	1400	4790
Manganese	698 JN	400 JN	406 JN	391 JN	292 JN
Mercury	0.06 B	0.06 U	0.05 U	0.05 U	0.06 U
Nickel	14.4	7.3 B	9.7	7.9 B	9.3 B
Potassium	1270	801 B	800 B	858 B	1140 B
Selenium	0.98 B	0.92 U	0.86 U	0.86 U	1 U
Sodium	37.7 BJ	31.4 BJ	36.4 BJ	26.7 BJ	33.5 BJ
Vanadium	32.5	24.3	24.5	19.2	20.2
Zinc	54.1 JN	31.3 JN	35.6 JN	32 JN	34.6 JN
Cyanide	0.35 BJ	0.37 BJ	0.25 BJ	0.28 BJ	0.27 BJ

Southeast Rockford Hits Table - Organic Creek Sediment Sample Analysis - Area 7

Date Sampled	06/10/96		06/10/96		06/10/96		06/10/96		06/10/96	
Sample Number	A7-CS-1		A7-CS-1-D		A7-CS-2		A7-CS-3		A7-CS-4	
Organic Traffic Report Number	EBFY6		EBFY7		EBFY8		EBFY9		EBFZ0	
Volatile Organics (ug/Kg)										
1,2-Dichloropropane	13	J	2	J	12	U	13	U	13	JBU
Semivolatile Organics (ug/Kg)										
Phenanthrene	110	J	100	J	380	U	56	J	240	J
Fluoranthene	240	J	250	J	92	J	120	J	590	
Pyrene	86	J	92	J	42	J	100	J	140	J
Benzo(a)anthracene	120	J	110	J	38	J	54	J	230	J
Chrysene	130	J	140	J	44	J	69	J	270	J
bis(2-Ethylhexyl)Phthalate	140	J	210	J	430		140	J	260	J
Benzo (b) Fluoranthene	250	XJ	240	XJ	94	XJ	120	XJ	510	X
Benzo (k) Fluoranthene	260	XJ	260	XJ	99	XJ	130	XJ	540	X
Benzo (a) Pyrene	420	U	420	U	380	U	440	U	54	J
Pesticides & PCBs (ug/Kg)										
delta-BHC	0.65	JP	0.66	JP	0.29	JP	0.58	JP	1.2	JP
Aldrin	2.2	U	2.2	U	2	U	0.37	JP	2.3	U
Dieldrin	0.38	JP	0.23	JP	0.24	J	0.23	JP	0.21	JP
4,4'-DDE	0.4	JP	0.33	JP	0.22	JP	0.34	JP	4.4	U
Endosulfan II	4.2	U	0.3	J	3.8	U	0.31	J	4.4	U
4,4'-DDD	0.55	JP	0.86	JP	1.9	JP	0.37	JP	0.47	JP
Methoxychlor	2.1	JP	1.5	JP	0.76	JP	3.8	JP	4.6	JP
alpha-Chlordane	0.31	JP	0.24	JP	0.21	JP	0.23	JP	0.53	JP
Aroclor-1254	46	P	48	P	23	JP	56		44	U

Southeast Rockford Hits Table - Organic Surface Water Sample Analysis - Area 7

Date Sampled	06/10/96	06/10/96	06/10/96	06/10/96	06/10/96
Sample Number	A7-SW-1	A7-SW-1-B	A7-SW-2	A7-SW-2-D	A7-SW-3
Organic Traffic Report Number	EBFZ1	EBFZ2	EBFZ3	EBFZ4	EBFZ5
Volatile Organics (ug/L)					
Chloroethane	10 U	10 U	10 U	10 U	10
1,1-Dichloroethene	1 J	10 U	10 U	10 U	10 U
1,1-Dichloroethane	19	10 U	13	13	30
1,2-Dichloroethene (total)	54	10 U	31	33	42
1,1,1-Trichloroethane	36	10 U	19	20	7 J
Trichloroethene	1 J	10 U	10 U	10 U	1 J
Semivolatile Organics (ug/L)					
4-Nitrophenol	25 U	25 U	2 J	25 U	25 U
Diethylphthalate	10 U	2 J	10 U	10 U	10 U
Pyrene	10 U	10 U	2 J	10 U	10 U
Pesticides & PCBs (ug/L)					
alpha-BHC	0.05 U	0.05 U	0.0012 J	0.05 U	0.05 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.001 JP	0.05 U	0.05 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.1 U	0.00086 JP
Endosulfan II	0.1 U	0.0037 JP	0.1 U	0.1 U	0.002 JP
Endrin ketone	0.0024 J	0.1 U	0.1 U	0.0023 J	0.0024 JP
Endrin aldehyde	0.1 U	0.1 U	0.0026 JP	0.1 U	0.0022 JP

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BOREHOLE LOG
SB7-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 795
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 29
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 15
Drilling Date: Start 6/25/96 **End** 6/25/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: SNEHAL S. BHAGAT

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					795.0 0		0'-2.4': Dark brown TOPSOIL;
SS	SB7-201-001	0.0	10"/24"	2;2; 3;4;			
SS	SB7-201-002	0.0	12"/24"	3;1; 3;3;			2.4'-5.3': Dark brown, clayey TOPSOIL;
SS	SB7-201-003	1.4	20"/24"	2;4; 9;9;	790.0 5		5.3'-6.7': Brown/tan, fine to med. SAND; dry to moist;
SS	SB7-201-004	18	22"/24"	3;4; 6;6;			6.7'-8.9': Brown, gravelly, med. SAND; rootlets; moist;
SS	SB7-201-005	58	16"/24"	6;9; 11;13;	785.0 10		8.9'-11.9': Brown SILT; clayey; moist;
SS	SB7-201-006	360	17"/24"	11;13; 15;17;			11.9'-12.7': Gray, med. SAND; wet;
SS	SB7-201-007	610	19"/24"	19;23; 25;29;			12.7'-14.9': Brown, fine to med. SAND; wet;
SS	SB7-201-008	850	22"/24"	12;19; 25;41;	780.0 15		14.9'-16.9': Dark gray to black, med. to coarse SAND; saturated;
SS	SB7-201-009	>1000	24"/24"	15;33; 37;45;			16.9'-19.0': Brown, gravelly, med. to coarse SAND; petroleum-like odor;
SS	SB7-201-010	190	18"/24"	19;21; 23;16;	775.0 20		19.0'-22.9': Brown, gravelly, med. SAND; silt observed 19.0'-20.5'; NOTE: Sample SB7-201-009 tested negative for NAPL using Sudan IV dye; Sample -013 tested positive for NAPL;
SS	SB7-201-011	720	22"/24"	3;10; 13;10;			
SS	SB7-201-012	760	20"/24"	8;5; 8;10;			22.9'-24.1': Brown/gray, gravelly, med. to coarse SAND;
							24.1'-25.0': Brown, gravelly, sandy CLAY;

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB7-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB7-201-013	870	24"/24'	7;12; 4;8;			25.0'-27.0': Dark gray, coarse SAND and GRAVEL; very strong solvent- like odor; visible oily sheen; dark brown, immiscible, oily liquid observed;
SS	SB7-201-014	>1,000	24"/24'	17;29; 36;42;			27.0'-29.0': Gray, sandy GRAVEL;
					765.0 30		29': Bottom of Boring Boring terminated at 29' to prevent downward migration of immiscible, oily liquid.
					760.0 35		
					755.0 40		
					750.0 45		
					745.0 50		
					740.0 55		
					735.0 60		

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BOREHOLE LOG
SB7-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1881-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 793
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 27
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 13
Drilling Date: Start 6/25/98 End 6/25/98
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: SNEHAL S. BHAGAT

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					793.0 0		0'-2.8': Dark brown to black, clayey TOPSOIL;
SS	SB7-202-001	1.5	20"/24"	1;3; 3;3;			
SS	SB7-202-002	1.2	18"/24"	1;3; 6;7;			2.8'-4.8': Brown, clayey, gravelly, med. to coarse SAND; moist to saturated;
SS	SB7-202-003	12	19"/24"	3;9; 13;13;	788.0 5		4.8'-6.8': Brown, gravelly, silty fine SAND; wet;
							6.8'-7.7': Brown, gravelly, fine to med. SAND; wet;
SS	SB7-202-004	240	17"/24"	8;8; 13;15;			7.7'-10.8': Brown, SILT to fine SAND; trace gravel; wet;
SS	SB7-202-005	>1,000	20/24"	7;14; 15;16;	783.0 10		
SS	SB7-202-006	>1,000	18"/24"	8;17; 24;24;			10.8'-13.5': Brown, silty, fine SAND; some gravel; water table at approx. 13'; sample SB7-202-006 sent for laboratory analysis;
							NOTE: Samples SB-202-007, -009, and -012 tested negative for NAPL using Sudan IV dye;
SS	SB7-202-007	>1,000	24"/24"	13;18; 28;25;	778.0 15		13.5'-15.0': Gray to brown, coarse SAND;
SS	SB7-202-008	180	17"/24"	8;25; 40;25;			15.0'-16.4': Brown, gravelly SILT;
							16.4'-17.5': Gray to dark gray, gravelly, coarse SAND;
SS	SB7-202-009	40	16"/24"	10;22; 36;37;			17.5'-18.7': Brown, gravelly, clayey SILT;
SS	SB7-202-010	32	17"/24"	19;31; 30;37;	773.0 20		18.7'-22.6': Brown, gravelly, med. to coarse SAND;
SS	SB7-202-011	70	14"/24"	19;31; 44;45;			
SS	SB7-202-012	60	24"/24"	12;16; 20;29;			22.6'-25.0': Brown, sandy and gravelly CLAY;

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
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DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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BOREHOLE LOG
SB7-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB7-202-013	56	24"/24"	10;12; 16;19;			25.0'-27.0': Gray, sandy and gravelly CLAY;
							27': Bottom of Boring
					763.0 30		
					758.0 35		
					753.0 40		
					748.0 45		
					743.0 50		
					738.0 55		
					733.0 60		

Appendix D

APPENDIX D
AREA 11 DATA
JULY 2000

Area 11 Soil Gas Concentrations

Southeast Rockford Source Control Operable Unit, Rockford, Illinois

Sample ID	SG11-101	SG11-102	SG11-103	SG11-104	SG11-105	SG11-106	SG11-107	SG11-108	SG11-109	SG11-110
Compound (µg/L)										
Benzene	7	2	< 1	3	4	13	5	7	< 1	3
Toluene	130	130	130	28	38	74	71	55	50	80
Ethylbenzene	< 1	9	5	2	3	29	14	13	14	23
Xylene isomers	10	7	8	4	5	64	31	29	28	36
Total BTEX	< 148	148	< 144	37	50	180	121	104	< 93	142
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	12	22	16	2	21	** 200	190	200	68	30
Trichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	14	50	13	5	< 1	23	17	24	< 1	< 1
Total VOCs	< 31	< 77	< 34	< 12	< 27	**< 228	< 212	< 229	< 74	< 36
TOTAL 1,2-DCE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds

** Results are estimated values only.

Area 11 Soil Gas Concentrations

Southeast Rockford Source Control Operable Unit, Rockford, Illinois

Sample ID	SG11-111	SG11-112	SG11-113	SG11-114	SG11-115	SG11-116	SG11-117	SG11-118	SG11-119	SG11-120
Compound (µg/L)										
Benzene	5	< 2	4	75	10	2	2	< 1	10	< 1
Toluene	66	15	130	** 590	131	< 2	< 2	83	79	50
Ethylbenzene	20	< 2	2	** 290	8	6	< 2	23	18	11
Xylene isomers	30	< 6	7	** 1000	7	< 2	< 6	39	35	28
Total BTEX	121	< 25	143	** 1955	156	< 12	< 12	< 146	142	< 90
Vinyl Chloride	< 1	< 2	20	< 1	< 1	< 2	< 2	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 2	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 2	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1	< 2	< 1	10	< 1	< 2	< 2	< 1	< 1	< 1
1,1,1-Trichloroethane	57	18	57	9	19	< 2	< 2	4	54	40
Trichloroethene	< 1	< 2	< 1	8	< 1	< 2	< 2	< 1	< 1	< 1
Tetrachloroethene	< 1	< 2	< 1	< 1	< 1	< 2	< 2	< 1	87	38
Total VOCs	< 63	< 30	< 82	< 31	< 25	< 14	< 14	< 10	< 146	< 83
TOTAL 1,2-DCE	< 2	< 4	< 2	< 11	< 2	< 4	< 4	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds

** Results are estimated values only.

Sample ID	SG11-121	SG11-122	SG11-123	SG11-124	SG11-125	SG11-126	SG11-127	SG11-128	SG11-129	SG11-130
Compound (µg/L)										
Benzene	< 1	5	5	8	< 2	< 2	< 2	< 1	< 2	< 2
Toluene	< 1	56	< 2	< 2	8	8	9	25	18	< 2
Ethylbenzene	< 1	< 1	< 2	< 2	< 2	5	< 2	3	7	< 2
Xylene isomers	< 3	66	38	< 2	7	18	< 6	18	19	< 6
Total BTEX	< 6	< 128	< 47	< 14	< 19	< 33	< 19	< 47	< 46	< 12
Vinyl Chloride	< 1	< 1	< 2	< 2	< 2	< 2	< 2	< 1	< 2	< 2
Trans-1,2-Dichloroethene	< 1	< 1	< 2	< 2	< 2	< 2	< 2	< 1	< 2	< 2
1,1-Dichloroethane	< 1	< 1	< 2	< 2	< 2	< 2	< 2	< 1	< 2	< 2
Cis-1,2 Dichloroethene	< 1	< 1	< 2	< 2	< 2	< 2	< 2	< 1	< 2	< 2
1,1,1-Trichloroethane	< 130	130	58	44	180	110	33	50	40	11
Trichloroethene	< 1	< 1	< 2	< 2	< 2	< 2	< 2	< 1	< 2	< 2
Tetrachloroethene	13	15	< 2	< 2	400	< 2	< 3	32	< 2	< 2
Total VOCs	< 148	< 150	< 70	< 56	< 590	< 122	< 46	< 87	< 52	< 23
TOTAL 1,2-DCE	< 2	< 2	< 4	< 4	< 4	< 4	< 4	< 2	< 4	< 4

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds

** Results are estimated values only.

Area 11 Soil Gas Concentrations

Southeast Rockford Source Control Operable Unit, Rockford, Illinois

Sample ID	SG11-131	SG11-132	SG11-133	SG11-134	SG11-135	SG11-136	SG11-137	SG11-138	SG11-139
Compound (µg/L)									
Benzene	< 2	< 2	< 1	< 1	< 1	< 1	< 1	28	3
Toluene	5	13	23	< 1	< 1	< 1	14	19	29
Ethylbenzene	< 2	6	3	9	< 1	5	4	7	14
Xylene isomers	< 2	17	15	19	8	14	11	15	19
Total BTEX	< 11	< 38	< 42	30	< 11	< 21	< 30	69	65
Vinyl Chloride	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	30	73	48	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethene	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total VOCs	< 42	< 85	< 54	< 7	< 7	< 7	< 7	< 7	< 7
TOTAL 1,2-DCE	< 4	< 4	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds

** Results are estimated values only.

Sample ID	SG11-140	SG11-141	SG11-142	SG11-143	SG11-144	SG11-145	SG11-146	SG11-147	SG11-148
Compound (µg/L)									
Benzene	< 1	< 1	< 1	< 1	< 1	4	11	< 2	
Toluene	20	14	25	< 1	16	22	13	19	
Ethylbenzene	7	5	4	< 1	17	8	19	6	
Xylene isomers	16	11	29	3	3	4	110	17	
Total BTEX	< 44	< 31	< 59	< 6	< 37	38	153	< 44	< 0
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	
Trans-1,2-Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	
1,1-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	
Cis-1,2 Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	3	< 2	
1,1,1-Trichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	** 880	
Trichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	110	
Tetrachloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	51	
Total VOCs	< 7	< 7	< 7	< 7	< 7	< 7	< 9	**< 1049	< 0
TOTAL 1,2-DCE	< 2	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 0

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds

** Results are estimated values only.

Sample ID	SG11-149	SG11-150	SG11-151	SG11-152	SG11-153	SG11-154
Compound (µg/L)						< 1
Benzene	< 1	< 1	72	9	170	21
Toluene	< 1	< 1	41	29	< 1	3
Ethylbenzene	38	26	20	4	980	20
Xylene isomers	< 1	< 3	4	22	1100	
Total BTEX	< 41	< 31	137	64	< 2251	< 44
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1	< 1	< 1	2	< 1	< 1
1,1,1-Trichloroethane	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethene	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	1	< 1	< 1	< 1	< 1	1
Total VOCs	< 7	< 7	< 7	< 8	< 7	< 7
TOTAL 1,2-DCE	< 2	< 2	< 2	< 3	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 11

Date Sampled	07/03/96	06/29/96	06/30/96	06/30/96	06/17/96	06/17/96	06/17/96	06/17/96	06/17/96	06/17/96
Sample Number	SB11-204-21	SB11-201-29	SB11-203-11	SB11-202-9	SB11-105(S)	SB11-105(D)	SB11-106(S)	SB11-106(D)	SB11-107(S)	SB11-107(S)-D
Organic Traffic Report Number	EBGR9	EBGR5	EBGR6	EBGR7	EBGE0	EBGE1	EBGE2	EBGE3	EBGE4	EBGE5
Volatile Organics (ug/Kg)										
Acetone	11 JBU	35 BU	5100 J	27000 U	10 U	4 J	10 U	2 J	3 J	10 U
2-Butanone	11 U	4 J	13000 UJ	27000 UJ	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	11 U	4 J	13000 U	27000 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	11 U	12 U	13000 U	27000 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	11 JBU	13 BU	180000 J	180000	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	11 U	12 U	20000	120000	10 U	10 U	10 U	10 U	10 U	10 U
Xylene	2 J	1 J	110000	650000	10 U	10 U	10 U	10 U	10 U	10 U

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 11

Date Sampled	06/17/96	06/17/96	06/17/96	06/17/96	06/17/96	06/17/96	06/17/96	06/18/96	06/18/96	06/18/96
Sample Number	SB11-107(D)	SB11-109(S)	SB11-109(D)	SB11-110(S)	SB11-110(D)	SB11-108(S)	SB11-108(D)	SB11-111(S)	SB11-111(D)	SB11-112(S)
Organic Traffic Report Number	EBGE6	EBGE7	EBGE8	EBGE9	EBGF0	EBGF1	EBGF2	EBGF3	EBGF4	EBGF5
Volatile Organics (ug/Kg)										
Acetone	3 J	10 U	10 U	10 U	4 J	4 J	3 J	11 BJU	14 BJU	11 U
2-Butanone	11 U	10 U	10 U	10 U	11 U	10 U	11 U	11 U	14 U	11 U
1,1,1-Trichloroethane	11 U	10 U	10 U	10 U	11 U	10 U	11 U	11 U	14 U	11 U
Tetrachloroethene	11 U	10 U	10 U	10 U	11 U	10 U	11 U	11 U	14 U	1 J
Toluene	11 U	10 U	10 U	10 U	11 U	10 U	11 U	11 U	14 U	11 U
Ethylbenzene	11 U	10 U	10 U	10 U	11 U	10 U	11 U	11 U	14 U	11 U
Xylene	11 U	10 U	10 U	10 U	11 U	10 U	11 U	11 U	14 U	11 U

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 11

Date Sampled	06/18/96	06/18/96	06/18/96	06/14/96	06/14/96	06/14/96	06/14/96	06/14/96	06/14/96	06/14/96
Sample Number	SB11-112(D)	SB11-113(S)	SB11-113(D)	SB11-101(S)	SB11-101(D)	SB11-102(S)	SB11-102(D)	SB11-103(S)	SB11-103(D)	SB11-104(S)
Organic Traffic Report Number	EBGF6	EBGF7	EBGF8	EBGD0	EBGD1	EBGD2	EBGD3	EBGD4	EBGD5	EBGD6
Volatile Organics (ug/Kg)										
Acetone	12 BJU	11 BJU	12 U	15 BJU	13 BJU	11 BJU	10 BJU	10 BJU	10 BJU	20 BJU
2-Butanone	11 U	11 U	12 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	13 UJ
1,1,1-Trichloroethane	11 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U	10 U	13 U
Tetrachloroethene	2 J	11 U	12 U	10 U	10 U	10 U	10 U	10 U	10 U	13 U
Toluene	11 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U	10 U	13 U
Ethylbenzene	11 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U	10 U	13 U
Xylene	11 U	11 U	12 U	10 U	10 U	10 U	10 U	10 U	10 U	13 U

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 11

Date Sampled	06/14/96
Sample Number	SB11-104(D)
Organic Traffic Report Number	EBGD7

Volatile Organics (ug/Kg)

Acetone	12	BJU
2-Butanone	10	UJ
1,1,1-Trichloroethane	10	U
Tetrachloroethene	10	U
Toluene	10	U
Ethylbenzene	10	U
Xylene	10	U

Southeast Rockford Hits Table - Inorganic Sub-surface Soil Boring Sample Analysis - Area 11

Date Sampled	07/03/96	
Sample Number	SB11-204-21	
Inorganic Traffic Report Number	MEAPL9	
Inorganics (mg/Kg)		
Aluminum	1300	*
Antimony	7.6	BN
Arsenic	0.63	B
Barium	5.3	B
Calcium	43400	
Chromium	4.4	*
Cobalt	1.7	B
Copper	3.2	B
Iron	4050	*
Lead	1.6	
Magnesium	19500	*
Manganese	107	
Nickel	4.5	B
Potassium	165	B
Sodium	104	B
Thallium	0.13	B
Vanadium	6.4	B
Zinc	8.9	
Cyanide	0.31	B

Southeast Rockford Hits Table - Organic Surface Soil Analysis - Area 11

Date Sampled	06/11/96	06/11/96	06/11/96	06/11/96	06/11/96	06/24/96	06/24/96
Sample Number	SS11-204	SS11-205	SS11-201	SS11-202	SS11-203	SS11-207	SS11-206
Organic Traffic Report Number	EBFZ9	EBGA0	EBFZ6	EBFZ7	EBFZ8	EBGK3	EBGK2
Volatile Organics (ug/Kg)							
No Hits							
Semivolatile Organics (ug/Kg)							
Naphthalene	42 J	390 U	380 U	370 U	360 U	15000 J	14000 U
2-Methylnaphthalene	45 J	390 U	380 U	370 U	360 U	120000 UJ	14000 U
Acenaphthene	70 J	390 U	380 U	370 U	360 U	39000 J	14000 U
Dibenzofuran	57 J	390 U	380 U	370 U	360 U	33000 J	14000 U
Fluorene	130 J	390 U	380 U	370 U	360 U	47000 J	14000 U
Phenanthrene	820	83 J	54 J	88 J	120 J	370000 J	4300 J
Anthracene	160 J	390 U	380 U	370 U	360 U	93000 J	14000 U
Carbazole	65 J	390 U	380 U	370 U	360 U	67000 J	14000 U
Di-n-Butylphthalate	190 J	110 J	160 J	370 U	94 J	120000 UJ	5200 J
Fluoranthene	1300	160 J	110 J	160 J	280 J	440000 J	8700 J
Pyrene	280 J	390 U	380 U	370 U	57 J	430000 J	7600 J
Butylbenzylphthalate	400 U	390 U	380 U	44 J	360 U	120000 UJ	14000 U
Benzo(a)anthracene	770	79 J	69 J	85 J	140 J	200000 J	3200 J
Chrysene	570	79 J	52 J	75 J	140 J	240000 J	3800 J
bis(2-Ethylhexyl)Phthalate	3100	880	2600	24000 D	11000 D	40000 J	37000 J
Di-n-Octyl Phthalate	400 U	390 UJ	380 UJ	100 J	66 J	120000 UJ	14000 U
Benzo (b) Fluoranthene	680	86 J	99 XJ	87 J	240 JX	220000 J	3500 J
Benzo (k) Fluoranthene	380 J	50 J	100 XJ	46 J	270 JX	130000 J	2400 J
Benzo (a) Pyrene	96 J	390 U	380 U	370 U	360 U	150000 J	2400 J
Ideno (1,2,3-cd) Pyrene	63 J	390 U	380 U	370 U	360 U	120000 J	2100 J
Dibenzo (a,h) Anthracene	70 J	390 U	380 U	370 U	360 U	120000 UJ	14000 U
Benzo (g,h,i) Perylene	400 U	390 UJ	380 UJ	370 UJ	360 UJ	120000 J	2000 J
Pesticides & PCBs (ug/Kg)							
delta-BHC	2 U	0.38 JP	2 U	1.9 U	0.24 JP	2 UJ	2.3 U
Heptachlor	2 U	2 U	2 U	1.9 U	1.8 U	13 JP	2.3 U
Aldrin	2 U	2 U	2 U	1.9 U	0.69 JP	2 UJ	2.3 P
Heptachlor epoxide	0.54 JP	2 U	2 U	1.9 U	1.8 U	24 JP	3.7 U
Endosulfan I	0.64 JP	2 U	2 U	1.9 U	1.8 U	2 UJ	2.3 U
Dieldrin	6.6	0.31 JP	0.11 JP	0.21 JP	0.67 JP	3.8 UJ	10 PJ
4,4'-DDE	3.5 J	3.9 U	0.79 J	3.7 U	3.6 U	3.8 UJ	4.4 U
Endrin	4 U	0.68 JP	3.8 U	3.7 U	1.2 J	3.8 UJ	4.4 U
Endosulfan II	3.2 JP	3.9 U	0.36 JP	3.7 U	3.6 U	3.8 UJ	4.4 U
4,4'-DDD	2.1 JP	3.9 U	3.8 U	0.34 JP	3.6 U	12 JP	4.4 U
4,4'-DDT	4 U	3.9 U	3.8 U	3.7 U	0.94 JP	3.8 UJ	4.4 U
Methoxychlor	30 P	4.6 JP	6.5 JP	9.4 JP	7.7 JP	20 UJ	23 U
Endrin ketone	1.1 JP	3.9 U	3.8 U	3.7 U	3.6 U	11 JP	4.4 U
Endrin aldehyde	0.82 JP	3.9 U	3.8 U	0.47 J	3.6 U	9.7 JP	4.4 U
alpha-Chlordane	2.9 P	0.5 JP	0.35 JP	0.36 JP	0.54 JP	120 PEJ	2.3 U
gamma-Chlordane	2 U	2 U	2 U	1.9 U	1.8 U	180 EJ	3 PJ
Aroclor-1254	530	39 U	57 P	31 J	31 JP	38 UJ	44 U
Aroclor-1260	40 U	39 U	38 U	37 U	36 U	350 JP	450 J

Southeast Rockford Hits Table - Inorganic Surface Soil Sample Analysis - Area 11

Date Sampled	06/11/96	06/11/96	06/11/96	06/11/96	06/11/96	06/24/96	06/24/96
Sample Number	SS11-201	SS11-202	SS11-203	SS11-204	SS11-205	SS11-206	SS11-207
Inorganic Traffic Report Number	MEAPC6	MEAPC7	MEAPC8	MEAPC9	MEAPD0	MEAPK2	MEAPK3
Inorganics (mg/Kg)							
Aluminum	5690 *J	413 *J	526 *J	905 *J	3550 *J	4220	3280
Antimony	0.55 B	0.46 U	0.52 B	0.47 U	0.44 U	2.4 UJN	2.1 UJN
Arsenic	6.5	1 B	1.3 B	2.2 B	3.5	6.4	5.3
Barium	96.8	6.5 B	11 B	19.1 B	39.6 B	131	89.1
Beryllium	0.49 B	0.23 U	0.22 U	0.23 U	0.25 B	0.88 BJ	0.47 B
Cadmium	0.45 B	0.26 B	4.3	0.39 B	0.37 B	2.9	1.2
Calcium	5670 *J	184000 *J	159000 *J	144000 *J	85100 *J	8300	100000
Chromium	17.8	4.3	20.7	21.2	9.3	18.8	22.7
Cobalt	7.6 B	0.8 B	1.1 B	1.5 B	2.5 B	6.5 B	3.1 B
Copper	22.2	4.1 B	9.4	15.7	10.6	90.9	30.2
Iron	12300 *J	3500 *J	4240 *J	7750 *J	7580 *J	21500	10200
Lead	85.3	15.5	107	65.6	31.3	137	458
Magnesium	3200 *J	119000 *J	101000 *J	90800 *J	52400 *J	3700	61700
Manganese	377 NJ	211 NJ	198 NJ	235 NJ	283 NJ	250 JN	292 JN
Mercury	0.12 U	0.11 U	0.11 U	0.12 U	0.11 U	0.08 B	0.06 B
Nickel	10.6	2.5 B	3.5 B	7.3 B	5.9 B	18.4	9.7
Potassium	636 B	231 B	169 B	163 B	474 B	641 B	316 B
Selenium	2 NJ	0.69 UN	0.66 UN	0.7 UN	0.76 BNJ	1.3	0.88 U
Sodium	76.3 B	162 B	152 B	148 B	100 B	74.8 BJ	117 B
Thallium	1.3 B	0.92 U	0.89 B	0.93 U	1.3 B	1.4 U	1.3 U
Vanadium	24.1	2.5 B	2.9 B	4 B	10.7 B	21	12.3
Zinc	107	32.5	75	84.1	62.4	165 JN	263 JN
Cyanide	0.23 B	0.35 B	0.38 B	0.16 B	0.13 B	0.25 BJ	0.12 BJ

CAMP DRESSER & McKEE
CDM
233 South Wacker Drive, Suite 450
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BOREHOLE LOG
SB11-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1881-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 732
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 61
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 34.1
Drilling Date: Start 6/29/98 **End** 6/29/98
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: SNEHAL S. BHAGAT

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					732.0 0		0'-0.7': CONCRETE;
							0.7'-0.8': Crushed limestone gravel and med. sand FILL;
SS	SB11-201-001	140	17"/24"	5;4; 3;3;			0.8'-2.7': Black, clayey SILT; dry;
SS	SB11-201-002	3.2	8"/24"	2;2; 3;3;			2.7'-4.3': Dark brown, clayey, fine SAND to SILT; some med. sand and gravel; dry to slightly moist;
SS	SB11-201-003	4.2	16"/24"	3;4; 2;1;	727.0 5		4.3'-8.8': Reddish brown, well sorted, med. SAND; slightly moist;
SS	SB11-201-004	4.6	20"/24"	2;2; 2;2;			
SS	SB11-201-005	5.7	18"/24"	2;3; 4;6;	722.0 10		8.8'-12.8': Brown, well sorted, med. SAND; slightly moist;
SS	SB11-201-006	5.2	18"/24"	2;3; 6;6;			
SS	SB11-201-007	5.4	19"/24"	2;3; 7;6;			12.8'-27.0': Brown, well sorted, fine SAND; moist;
SS	SB11-201-008	7.5	18"/24"	2;4; 6;7;	717.0 15		
SS	SB11-201-009	6.8	19"/24"	4;7; 8;8;			
SS	SB11-201-010	6.2	19"/24"	2;4; 9;14;	712.0 20		
SS	SB11-201-011	4.4	22"/24"	9;15; 19;21;			
SS	SB11-201-012	4.0	23"/24"	8;13; 20;25;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

CAMP DRESSER & McKEE
CDM
233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

BOREHOLE LOG
SB11-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB11-201-013	7.5	23"/24"	12;13; 12;9;			
SS	SB11-201-014	6.5	18"/24"	3;6; 9;11;			27.0'-28.8': Brown, well sorted, fine SAND; moist;
SS	SB11-201-015	6.1	20"/24"	3;6; 7;9;	702.0 30		28.9'-30.8': Brown, well sorted, fine to med. SAND; moist to wet;
SS	SB11-201-016	6.2	22"/24"	4;7; 9;9;			30.8'-32.9': Brown, well sorted, med. SAND; wet;
SS	SB11-201-017	6.3	19"/24"	4;6; 6;7;			32.9'-34.8': Brown, well sorted, med. to coarse SAND; trace gravel; Saturated at approximately 34.1';
SS	SB11-201-018	3.9	20"/24"	3;4; 4;6;	697.0 35		34.8'-36.3': Brown, coarse SAND; some gravel;
SS	SB11-201-019	0.0	14"/24"	6;5; 6;6;			36.3'-38.6': Brown, coarse SAND and GRAVEL;
SS	SB11-201-020	0.2	7"/24"	7;5; 5;4;	692.0 40		38.6'-40.3': Brown, cobbly GRAVEL;
SS	SB11-201-021	0.4	13"/24"	6;8; 7;8;			40.3'-46.6': Brown, gravelly, coarse SAND and coarse SAND with some gravel;
SS	SB11-201-022	0.0	14"/24"	4;5; 8;10;			
SS	SB11-201-023	1.2	15"/24"	6;9; 13;12;	687.0 45		
SS	SB11-201-024	2.2	15"/24"	3;5; 9;12;			46.6'-50.6': Brown, moderately well sorted, med. to coarse SAND; some gravel;
SS	SB11-201-025	0.8	15"/24"	6;18; 39;30;	682.0 50		
SS	SB11-201-026	0.0	16"/24"	19;13; 13;11;			50.6'-54.6': Brown, coarse SAND and GRAVEL;
SS	SB11-201-027	0.0	14"/24"	5;8; 12;13;			
SS	SB11-201-028	0.1	14"/24"	13;11; 10;10;	677.0 55		54.6'-56.6': Brown, poor to moderately well sorted, coarse SAND; some gravel;
SS	SB11-201-029	1.4	15"/24"	5;7; 9;20;			56.6'-57.7': Brown, well sorted, med. SAND;
SS	SB11-201-030	1.0	14"/24"	8;13; 15;18;	672.0 60		57.7'-60.6': Brown, well sorted, fine to med. SAND;
							61': Bottom of Boring

CAMP DRESSER & McKEE
CDM
233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

BOREHOLE LOG
SB11-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 729
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 65
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 31
Drilling Date: **Start** 6/29/96 **End** 6/30/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: SNEHAL S. BHAGAT and C. ROBIN SWANK

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev./ Depth (ft.)	Graphic Log	Material Description
					729.0 0		0'-7': SAMPLES NOT COLLECTED;
					724.0 5		
SS	SB11-202-001	0.6	17"/24"	2;2; 4;4;			7.0'-8.4': Brown, well sorted, med. SAND; trace gravel;
					719.0 10		
					714.0 15		19.0'-20.6': Gray to dark gray, well sorted, fine to med. SAND; moist;
SS	SB11-202-002	39	19"/24"	5;6; 9;10;	709.0 20		Samples SB11-202-009 to -011 tested positive for NAPL using Sudan IV dye; samples -005, -013, -015 and -016 tested negative;

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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CDM
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BOREHOLE LOG
SB11-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB11-202-003	12	20"/24"	5;9; 9;13;			
SS	SB11-202-004	320	20"/24"	8;9; 8;10;	699.0 30		28.8'-30.8': Gray, well sorted, med. SAND; moist;
SS	SB11-202-005	>1,000	22"/24"	3;6; 11;14;			30.8'-37.0': Gray coarse SAND; some gravel; saturated at 31'; running sand encountered at 35'; switch to mud rotary at 35';
SS	SB11-202-006	700	23"/24"	3;5; 8;11;			
SS	SB11-202-007	760	24"/24"	3;5; 6;11;	694.0 35		
SS	SB11-202-008	500	17"/24"	9;18; 23;13;			37.0'-38.7': Gray, coarse SAND and GRAVEL;
SS	SB11-202-009	>1,000	14"/24"	4;7; 15;15;	689.0 40		38.7'-64.2': Gray, gravelly, coarse SAND;
SS	SB11-202-010	740	16"/24"	7;14; 22;18;			
SS	SB11-202-011	>1,000	14"/24"	8;15; 16;19;			
SS	SB11-202-012	580	14"/24"	6;7; 8;11;	684.0 45		
SS	SB11-202-013	760	15"/24"	6;8; 16;16;			
SS	SB11-202-014	800	14"/24"	15;16; 13;12;	679.0 50		
SS	SB11-202-015	680	15"/24"	10;9; 13;17;			
SS	SB11-202-016	700	13"/24"	9;12; 12;11;			
SS	SB11-202-017	340	15"/24"	8;10; 15;17;	674.0 55		
SS	SB11-202-018	240	17"/24"	9;16; 25;21;			
SS	SB11-202-019	19	10"/24"	9;11; 17;18;	669.0 60		
SS	SB11-202-020	2.2	15"/24"	7;9; 15;16;			
SS	SB11-202-021	1.4	14"/24"	9;15; 17;20;			65': Bottom of Boring

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BOREHOLE LOG
SB11-203

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.R1

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 729
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 57
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 32
Drilling Date: **Start** 6/30/96 **End** 6/30/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed E Not Surveyed
Logged By: SNEHAL S. BHAGAT and C. ROBIN SWANK

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					729.0 0		0'-5.0': SAMPLES NOT COLLECTED;
SS	SB11-203-001	1.1	18"/24"	1;2; 3;5;	724.0 5		5.0'-8.3': Brown, fine SAND; trace gravel;
							8.3'-13.1': Dark brown, fine SAND;
SS	SB11-203-002	15	15"/24"	4;7; 12;12;	719.0 10		
							13.1'-18.2': Gray, fine SAND;
SS	SB11-203-003	11	16"/24"	4;4; 6;6;	714.0 15		
							18.2'-30.8': Brown-tan, fine SAND;
SS	SB11-203-004	58	18"/24"	9;12; 12;9;	709.0 20		

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Services).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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BOREHOLE LOG
SB11-203

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB11-203-005	49	17"/24"	8;11; 12;22;			
SS	SB11-203-006	40	19"/24"	8;10; 12;22;	699.0 30		
SS	SB11-203-007	180	16"/24"	10;12; 11;11;			30.8'-32.7': Gray, fine to med. SAND; saturated at 32';
SS	SB11-203-008	890	20"/24"	4;7; 7;9;	694.0 35		32.7'-57.0': Gray, gravelly, coarse SAND; black staining observed in samples SB11-203-008 and -011;
SS	SB11-203-009	780	20"/24"	7;7; 9;9;			
SS	SB11-203-010	>1,000	20"/24"	12;15; 7;12;			
SS	SB11-203-011	>1,000	22"/24"	4;7; 7;14;	689.0 40		NOTE: Samples SB11-203-011 and -012 tested positive for NAPL using Sudan IV dye; samples -010, -013, and -014 tested negative;
SS	SB11-203-012	>1,000	22"/24"	12;12; 15;17;			
SS	SB11-203-013	810	14"/24"	12;13; 15;12;			
SS	SB11-203-014	36	14"/24"	3;5; 7;7;	684.0 45		
SS	SB11-203-015	12	14"/24"	5;7; 13;13;			
SS	SB11-203-016	17	13"/24"	5;7; 11;13;			
SS	SB11-203-017	16	14"/24"	11;11; 13;15;	679.0 50		
SS	SB11-203-018	8.0	17"/24"	8;18; 23;16;			
SS	SB11-203-019	8.2	17"/24"	7;9; 15;23;	674.0 55		
							57': Bottom of Boring
					669.0 60		

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BOREHOLE LOG
SB11-204

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 730
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 61
Drillers: Dave Bowers, Scott Zelen
Depth to Initial Water Level (ft. BGS): 30.5
Drilling Date: **Start** 7/3/98 **End** 7/3/98
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: ANDREW R. KEAR

Sample Type #	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					730.0 0		0'-1': CONCRETE and FILL;
SS	SB11-204-001	16	18"/24"	2;2; 3;3;			1'-3': Dark brown to black, sandy CLAY;
SS	SB11-204-002	70	16"/24"	2;2; 2;3;			3'-11': Brown, fine to med. SAND;
SS	SB11-204-003	86	19"/24"	3;4; 6;6;	725.0 5		
SS	SB11-204-004	150	24"/24"	3;7; 7;8;			
SS	SB11-204-005	100	20"/24"	6;11; 13;13;	720.0 10		
SS	SB11-204-006	150	22"/24"	11;13; 14;11;			11'-13': Brown/gray, fine to med. SAND;
SS	SB11-204-007	60	22"/24"	3;10; 12;13;			13'-15': Brown, fine SAND;
SS	SB11-204-008	44	19"/24"	6;9; 10;12;	715.0 15		15'-31': Brown, fine to med. SAND;
SS	SB11-204-009	180	18"/24"	5;8; 10;9;			
SS	SB11-204-010	380	20"/24"	2;4; 6;7;	710.0 20		
SS	SB11-204-011	90	19"/24"	2;4; 5;7;			
SS	SB11-204-012	340	18"/24"	3;5; 8;11;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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CDM
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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB11-204

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev./ Depth (ft.)	Graphic Log	Material Description
SS	SB11-204-013	8.0	18"/24"	7;9; 13;11;			
SS	SB11-204-014	400	20"/24"	7;9; 16;13;			
SS	SB11-204-015	620	20"/24"	6;7; 9;9;	700.0 30		Saturated at 30.5';
SS	SB11-204-016	>1000	19"/24"	3;4; 6;7;			31'-37': Brown, fine to coarse SAND w/trace gravel (Sudan IV dye test negative for NAPL);
SS	SB11-204-017	>1000	19"/24"	6;16; 21;20;	695.0 35		33'-35': Sudan IV dye test negative for NAPL;
SS	SB11-204-018	>1000	13"/24"	3;4; 8;6;			37'-39': Brown/gray, med. to coarse SAND w/gravel;
SS	SB11-204-019	>1000	13"/24"	3;4; 7;8;			39'-41': Brown/gray, fine to coarse SAND w/trace gravel;
SS	SB11-204-020	>1000	14"/24"	8;13; 11;11;	690.0 40		41'-43': Brown/gray, fine to coarse SAND; Lab sample collected (Sudan IV dye test negative for NAPL);
SS	SB11-204-021	>1000	14"/24"	10;15; 23;23;			43'-45': Brown/gray, fine to coarse SAND w/some gravel (Sudan IV dye test negative for NAPL);
SS	SB11-204-022	>1000	16"/24"	8;11; 19;18;	685.0 45		45'-47': Brown/gray, fine to coarse SAND w/trace gravel; (Sudan IV dye test negative for NAPL);
SS	SB11-204-023	820	16"/24"	7;11; 15;17;			47'-49': Brown, fine to med. SAND w/trace gravel;
SS	SB11-204-024	>1000	16"/24"	9;18; 20;22;			49'-51': Brown, fine to coarse SAND w/trace gravel;
SS	SB11-204-025	>1000	18"/24"	10;15; 18;15;	680.0 50		51'-53': Brown, fine to coarse SAND w/some gravel;
SS	SB11-204-026	660	14"/24"	7;9; 10;16;			
SS	SB11-204-027	>1000	15"/24"	9;13; 12;15;			53'-55': Brown, fine to med. SAND;
SS	SB11-204-028	12	16"/24"	10;11; 15;16;	675.0 55		55'-59': Brown, fine to coarse SAND;
SS	SB11-204-029	2.0	15"/24"	6;9; 11;14;			
SS	SB11-204-030	4.0	17"/24"	7;10; 10;12;	670.0 60		59'-61': Brown/gray, fine to coarse SAND;
							61': Bottom of Boring

Appendix E

APPENDIX E
AREA 9/10 DATA
JULY 2000

Sample ID	SG9/10-10	SG9/10-102	SG9/10-103	SG9/10-104	SG9/10-105	SG9/10-10	SG9/10-107	SG9/10-10	SG9/10-109	SG9/10-110	SG9/10-111	SG9/10-112	SG9/10-113	SG9/10-114	SG9/10-115	SG9/10-116
Compound (µg/L)																
Benzene	150	< 1	** 220	< 1			< 1	8	36	< 1	< 1	24				10
Toluene	150	19	17	26			< 1	10	14	30	26	25				47
Ethylbenzene	5	11	< 1	17			5	4	78	11	11	10				10
Xylene isomers	7	72	11	120			7	10	99	< 1	190	** 230				35
Total BTEX	312	< 103	**< 249	< 164	0	0	< 14	32	227	< 43	< 228	** 289	0	0	0	102
Vinyl Chloride	56	< 1	< 1	27			< 1	< 1	< 1	< 1	< 1	< 1				< 1
Trans-1,2-Dichloroethene	64	< 1	29	< 2			< 1	11	2	< 1	< 1	< 1				< 1
1,1-Dichloroethane	140	18	120	24			< 1	1	< 1	< 1	4	< 1				< 1
Cis-1,2 Dichloroethene	< 1	9	< 1	8			12	< 1	< 1	39	33	< 1				< 1
1,1,1-Trichloroethane	64	110	95	290			< 1	< 1	< 1	85	120	< 1				3
Trichloroethene	4	19	< 1	6			< 1	< 1	< 1	< 1	< 1	< 1				< 1
Tetrachloroethene	93	68	132	48			12	3	< 1	< 1	< 1	< 1				< 1
Total VOCs	< 422	< 226	< 379	< 405	0	0	< 29	< 19	< 8	< 129	< 161	< 7	0	0	0	< 9
TOTAL 1,2-DCE	< 65	< 10	< 30	< 10	0	0	< 13	< 12	< 3	< 40	< 34	< 2	0	0	0	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-117	SG9/10-118	SG9/10-119	SG9/10-120	SG9/10-121	SG9/10-122	SG9/10-123	SG9/10-124	SG9/10-125	SG9/10-126	SG9/10-127	SG9/10-128	SG9/10-129	SG9/10-130	SG9/10-131
Compound (µg/L)															
Benzene	< 1		9	6	< 1	< 1	4	< 1	3	< 1	4		7	< 1	< 1
Toluene	32		51	42	4	< 1	34	5	19	24	19		50	55	2
Ethylbenzene	1		12	9	< 1	< 1	6	< 1	3	< 1	3		15	19	< 1
Xylene isomers	25		46	37	< 1	< 1	14	< 1	9	< 3	4		60	66	< 1
Total BTEX	< 59	0	118	94	< 7	< 4	58	< 8	34	< 29	30	0	132	< 141	< 5
Vinyl Chloride	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	34	39		< 1	< 1	< 1
1,1-Dichloroethane	< 1		< 1	< 1	< 1	< 1	< 1	< 1	4	170	130		< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1		< 1	< 1	< 1	< 1	< 1	< 1	19	** 200	** 273		< 1	< 1	< 1
1,1,1-Trichloroethane	4		< 1	5	< 1	< 1	21	< 1	** 283	** 1700	** 1100		7	< 1	< 1
Trichloroethene	< 1		< 1	4	< 1	< 1	2	22	87	** 320	** 290		< 1	< 1	< 1
Tetrachloroethene	< 1		< 1	< 1	< 1	< 1	2	< 1	172	** 650	** 350		< 1	< 1	< 1
Total VOCs	< 10	0	< 7	< 14	< 7	< 7	< 29	< 28	**< 567	**< 3075	**< 2183	0	< 13	< 7	< 7
TOTAL 1,2-DCE	< 2	0	< 2	< 2	< 2	< 2	< 2	< 2	< 20	** 234	** 312	0	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-132	SG9/10-133	SG9/10-134	SG9/10-135	SG9/10-136	SG9/10-137	SG9/10-138	SG9/10-139	SG9/10-140	SG9/10-141	SG9/10-142	SG9/10-143	SG9/10-144	SG9/10-145	SG9/10-146
Compound (µg/L)															
Benzene	< 2	10	13	4	16	< 1		< 1	< 1	< 1	< 1	< 1	7	8	25
Toluene	62	45	52	77	13	19		25	61	53	31	33	39	35	12
Ethylbenzene	5	11	11	20	< 1	< 1		7	10	11	4	4	7	6	< 1
Xylene isomers	22	34	31	44	4	6		22	43	33	15	16	22	22	5
Total BTEX	< 91	100	107	145	< 34	< 27	0	< 55	< 115	< 98	< 51	< 54	75	71	< 43
Vinyl Chloride	< 2	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 2	< 1	< 1	< 1	< 1	< 1		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 2	< 1	< 1	< 1	< 1	27		< 1	< 1	< 1	< 1	< 1	< 1	< 1	9
Cis-1,2 Dichloroethene	< 2	< 1	< 1	< 1	< 1	37		< 1	22	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	8	70	67	73	170	** 590		60	< 1	32	4	8	75	** 220	** 220
Trichloroethene	< 2	8	110	6	6	25		< 1	< 1	< 1	< 1	< 1	5	20	10
Tetrachloroethene	< 2	11	14	20	68	140		< 1	< 1	< 1	< 1	< 1	13	66	58
Total VOCs	< 20	< 93	< 195	< 103	< 248	<** 821	0	< 66	< 28	< 38	< 10	< 14	< 97	<** 310	<** 300
TOTAL 1,2-DCE	< 4	< 2	< 2	< 2	< 2	< 38	< 0	< 2	< 23	< 2	< 2	< 2	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-147	SG9/10-148	SG9/10-149	SG9/10-150	SG9/10-151	SG9/10-152	SG9/10-153	SG9/10-154	SG9/10-155	SG9/10-156	SG9/10-157	SG9/10-158	SG9/10-159	SG9/10-160	SG9/10-161
Compound (µg/L)															
Benzene	22	4	6	51	11	10	< 1	17	5	16	< 2	13	< 1	29	6
Toluene	15	35	31	70	41	46	53	69	49	12	13	63	< 1	64	44
Ethylbenzene	2	3	5	31	8	10	9	15	9	< 1	< 2	26	< 1	150	7
Xylene isomers	7	23	20	77	26	35	35	41	35	5	< 6	88	< 1	60	23
Total BTEX	46	65	62	229	86	101	< 98	142	98	< 34	< 23	190	< 4	303	80
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	4	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	2	< 1	< 1	< 1
1,1-Dichloroethane	< 1	12	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	8	34	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	** 380	** 760	87	< 1	< 1	5	11	130	200	** 280	** 574	** 1000	< 1	9	33
Trichloroethene	7	6	< 1	< 1	< 1	< 1	< 1	3	5	7	< 10	4	< 1	< 1	< 1
Tetrachloroethene	94	** 210	< 1	< 1	< 1	< 1	< 1	11	15	33	98	** 360	< 1	< 1	< 1
Total VOCs	<** 488	**< 1067	< 93	< 7	< 7	< 11	< 17	< 148	< 224	<** 324	<** 696	**< 1402	< 7	< 15	< 39
TOTAL 1,2-DCE	< 5	78	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 4	< 3	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-162	SG9/10-163	SG9/10-164	SG9/10-165	SG9/10-166	SG9/10-167	SG9/10-168	SG9/10-169	SG9/10-170	SG9/10-171	SG9/10-172	SG9/10-173	SG9/10-174	SG9/10-175	SG9/10-176
Compound (µg/L)															
Benzene	< 1	< 1	12	6	< 1	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	43	45	44	37	13	24	26	24	25	42	16	19	43	37	22
Ethylbenzene	8	8	11	8	< 1	< 2	< 2	2	4	12	2	3	13	20	3
Xylene isomers	25	27	34	30	4	7	7	11	17	35	8	9	30	69	10
Total BTEX	< 77	< 81	101	81	< 19	< 35	< 37	< 38	< 47	< 90	< 27	< 32	< 87	< 127	< 36
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 1	3	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	10	18	59	54	66	** 505	** 751	34	33	39	1	95	33	34	34
Trichloroethene	< 1	< 1	4	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	< 1	< 1	6	5	4	38	93	< 1	< 1	< 1	< 1	23	< 1	< 1	< 1
Total VOCs	< 16	< 24	< 75	< 64	< 75	<** 553	<** 854	< 40	< 39	< 45	< 7	< 123	< 39	< 40	< 40
TOTAL 1,2-DCE	< 2	< 2	< 4	< 2	< 2	< 4	< 4	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-177	SG9/10-178	SG9/10-179	SG9/10-180	SG9/10-181	SG9/10-182	SG9/10-183	SG9/10-184	SG9/10-185	SG9/10-186	SG9/10-187	SG9/10-188	SG9/10-189	SG9/10-190	SG9/10-191
Compound (µg/L)															
Benzene	< 1	< 1	< 1	< 1	< 1	6	9	< 1	20	10	< 1	< 1	< 1	50	101
Toluene	23	33	15	19	27	19	27	23	58	31	8	50	66	110	160
Ethylbenzene	2	7	< 1	3	2	20	4	4	8	5	7	< 1	< 1	< 1	109
Xylene isomers	7	20	8	10	14	< 3	16	12	24	14	** 260	282	124	269	371
Total BTEX	< 33	< 61	< 25	< 33	< 44	< 48	56	< 40	110	60	**< 276	< 334	< 192	< 430	741
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	17	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	15	93	< 1	< 1	< 1	< 1	< 1	12	< 1
Cis-1,2 Dichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	18	< 1	< 1	< 1	< 1	< 1	12	39
1,1,1-Trichloroethane	33	< 1	< 1	11	< 1	62	** 1900	** 1300	190	** 330	< 1	< 1	19	< 1	< 1
Trichloroethene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	44	< 1	< 1	< 1	45	< 1	1	< 1
Tetrachloroethene	< 1	< 1	< 1	< 1	< 1	< 1	89	20	< 1	< 1	< 1	< 1	< 1	23	32
Total VOCs	< 39	< 7	< 7	< 17	< 7	< 68	<* 2008	<** 1493	< 196	<** 336	< 7	< 51	< 25	< 51	< 76
TOTAL 1,2-DCE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	35	< 2	< 2	< 2	< 2	< 2	< 13	< 40

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-192	SG9/10-193	SG9/10-194	SG9/10-195	SG9/10-196	SG9/10-197	SG9/10-198	SG9/10-199	SG9/10-200	SG9/10-201	SG9/10-201A	SG9/10-202	SG9/10-203	SG9/10-204	SG9/10-205
Compound (µg/L)															
Benzene	78	< 2	60	52	< 1	** 220	59	1	7	< 1	< 1	4	6	2	< 1
Toluene	72	121	91	< 1	35	110	5	55	35	32	< 1	37	46	32	2
Ethylbenzene	85	< 2	46	< 1	16	120	< 1	15	< 1	4	< 1	5	7	5	< 1
Xylene isomers	** 270	190	** 280	190	30	190	130	57	10	20	< 3	26	35	26	< 3
Total BTEX	505	< 315	** 477	< 244	< 82	** 640	< 195	128	< 53	< 57	< 6	72	94	65	< 7
Vinyl Chloride	< 1	< 2	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 2	< 1	< 1	< 1	< 2	< 1	** 800	28	9	< 1	108	99	15	< 1
1,1-Dichloroethane	< 1	< 2	< 1	< 1	< 1	10	11	** 650	28	< 1	< 1	178	150	3	< 1
Cis-1,2 Dichloroethene	< 1	52	< 1	< 1	< 1	30	< 1	** 2800	141	53	< 1	** 900	** 1100	45	< 1
1,1,1-Trichloroethane	15	< 2	12	48	< 1	200	112	** 2800	** 730	** 711	25	** 1800	** 1600	** 320	< 1
Trichloroethene	27	3	< 1	3	< 1	18	3	26	< 1	2	< 1	2	< 1	< 1	< 1
Tetrachloroethene	28	40	49	38	< 1	** 410	** 200	7	< 1	21	2	** 210	7	< 1	< 1
Total VOCs	< 74	< 103	< 66	< 93	< 7	<** 672	<** 329	**< 7084	**< 930	**< 798	< 32	**< 3199	**< 2958	**< 386	< 7
TOTAL 1,2-DCE	< 2	< 54	< 2	< 2	< 2	< 32	< 2	** 3600	169	62	< 2	** 1008	** 1199	60	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-206	SG9/10-207	SG9/10-208	SG9/10-209	SG9/10-210	SG9/10-211	SG9/10-212	SG9/10-213	SG9/10-214	SG9/10-215	SG9/10-216	SG9/10-217	SG9/10-218	SG9/10-219	SG9/10-220
Compound (µg/L)															
Benzene	< 1	2	< 1	6	3	6	3	< 1	< 1	36	< 1	< 1	< 1	< 1	< 1
Toluene	14	12	< 1	17	32	48	37	30	31	45	12	6	11	< 1	10
Ethylbenzene	< 1	< 1	< 1	< 1	3	9	6	2	3	55	< 1	< 1	< 1	< 1	< 1
Xylene isomers	< 1	< 3	< 3	< 1	20	38	29	23	22	< 1	< 3	< 3	< 3	< 1	< 3
Total BTEX	< 17	< 18	< 6	< 25	58	101	75	< 56	< 57	< 137	< 17	11	< 16	< 4	< 15
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	11	25	< 1	76	2	< 1	< 1	< 1	< 1	< 1	< 1	89	196	< 1	< 1
1,1-Dichloroethane	< 1	14	< 1	** 210	98	49	< 1	15	< 1	< 1	< 1	** 450	** 1200	< 1	120
Cis-1,2 Dichloroethene	7	** 380	< 1	22	< 1	< 1	< 1	< 1	< 1	< 1	< 1	34	35	< 1	< 1
1,1,1-Trichloroethane	** 300	** 590	< 1	** 630	** 270	** 270	35	98	** 240	< 1	94	** 970	** 1100	< 1	** 260
Trichloroethene	27	< 1	< 1	14	< 1	< 1	< 1	< 1	< 1	< 1	2	21	19	< 1	12
Tetrachloroethene	< 1	10	< 1	41	< 1	< 1	< 1	< 1	< 1	< 1	< 1	92	11	< 1	< 1
Total VOCs	**< 348	**< 1021	< 7	**< 994	**< 374	**< 324	< 41	< 118	**< 246	< 7	< 101	**< 1657	**< 2562	< 7	**< 396
TOTAL 1,2-DCE	18	** 405	< 2	98	< 3	< 2	< 2	< 2	< 2	< 2	< 2	123	231	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9/10-221	SG9/10-222	SG9/10-223	SG9/10-224	SG9/10-225	SG9/10-226
Compound (µg/L)						
Benzene	< 1	84	9	< 1	41	< 1
Toluene	17	35	24	13	11	< 1
Ethylbenzene	< 1	7	< 1	< 1	6	< 1
Xylene isomers	5	15	12	10	17	11
Total BTEX	< 24	141	< 46	< 25	75	< 14
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	66	< 1	5	3	< 1
1,1-Dichloroethane	< 1	< 1	< 1	59	< 1	7
Cis-1,2 Dichloroethene	< 1	< 1	34	47	< 1	< 1
1,1,1-Trichloroethane	< 1	36	< 1	< 1	8	< 1
Trichloroethene	< 1	< 1	190	110	< 1	< 1
Tetrachloroethene	13	< 1	< 1	17	2	3
Total VOCs	< 19	< 107	< 229	< 240	< 17	< 15
TOTAL 1,2-DCE	< 2	< 67	< 35	52	< 4	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9-10-227	SG9-10-228	SG9-10-229	SG9-10-230	SG9-10-231	SG9-10-232	SG9-10-233	SG9-10-234	SG9-10-235	SG9-10-236	SG9-10-237	SG9-10-238	SG9-10-239	SG9-10-240	SG9-10-241	SG9-10-242
Compound (µg/L)																
Benzene	5							< 1	< 1	< 1	2	1	5	< 1	< 1	8
Toluene	14							< 1	5	4	5	8	19	< 1	4	21
Ethylbenzene	6							< 1	2	2	3	3	6	7	4	10
Xylene isomers	16							< 3	5	9	9	9	10	12	14	16
Total BTEX	41	< 0	< 0	0	0	< 0	< 0	< 6	< 13	< 16	19	< 21	40	< 21	< 23	55
Vinyl Chloride	< 1							< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	1							6	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1							15	< 1	< 1	10	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1							< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	10							** 287	83	150	160	26	< 1	< 1	< 1	< 1
Trichloroethene	< 1							< 1	6	31	15	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	10							** 268	82	** 250	160	3	< 1	< 1	< 1	< 1
Total VOCs	< 25	< 0	< 0	< 0	< 0	< 0	< 0	<** 579	< 175	<** 435	< 348	< 34	< 7	< 7	< 7	< 7
TOTAL 1,2-DCE	< 2	< 0	< 0	< 0	< 0	< 0	< 0	< 7	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9-10-243	SG9-10-244	SG9-10-245	SG9-10-246	SG9-10-247	SG9-10-248	SG9-10-249	SG9-10-250	SG9-10-251	SG9-10-252	SG9-10-253	SG9-10-254	SG9-10-255	SG9-10-256	SG9-10-257	SG9-10-258
Compound (µg/L)																
Benzene	5	< 1	< 1	< 1	< 1	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	20	20	10	4	15	14	2	< 1	< 1	< 1	< 1	< 1	2	8	9	6
Ethylbenzene	7	9	3	5	6	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	6	6	6
Xylene isomers	13	14	6	14	17	11	< 3	< 1	< 3	< 3	< 3	< 3	< 3	16	13	14
Total BTEX	45	< 44	< 20	< 24	< 39	37	< 7	< 4	< 6	< 6	< 6	< 6	< 7	< 31	< 29	< 27
Vinyl Chloride	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene	< 1	< 1	12	6	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	< 1	< 1	4	7	9	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cis-1,2 Dichloroethene	< 1	< 1	< 1	< 1	< 1	8	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	< 1	< 1	< 1	< 1	< 1	< 1	11	15	35	2	< 1	< 1	11	< 1	< 1	< 1
Trichloroethene	< 1	< 1	< 1	< 1	< 1	180	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	< 1	< 1	< 1	< 1	15	20	< 1	< 1	21	< 1	< 1	< 1	21	< 1	< 1	< 1
Total VOCs	< 7	< 7	< 18	< 15	< 27	< 220	< 17	< 21	< 61	< 8	< 7	< 7	< 37	< 7	< 7	< 7
TOTAL 1,2-DCE	< 2	< 2	< 13	< 7	< 2	< 9	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9-10-259	SG9-10-260	SG9-10-261	SG9-10-262	SG9-10-263	SG9-10-264	SG9-10-265	SG9-10-266	SG9-10-267	SG9-10-268	SG9-10-269	SG9-10-270	SG9-10-271	SG9-10-272	SG9-10-273	SG9-10-274
Compound (µg/L)																
Benzene	< 1	< 2	< 6	< 1	< 2	< 2	< 1	< 1			< 4	< 1			8	
Toluene	3	3	60	< 1	5	4	2	2			8	31			2	
Ethylbenzene	3	< 2	44	< 1	3	3	2	2			< 4	1			2	
Xylene isomers	6	7	** 370	< 3	10	9	6	5			14	7			8	
Total BTEX	< 13	< 14	<** 480	< 6	< 20	< 18	< 11	< 10	< 0	< 0	< 30	< 40	< 0	< 0	20	< 0
Vinyl Chloride	< 1	< 2	< 6	< 1	< 2	< 2	< 1	< 1			< 4	< 1			< 1	
Trans-1,2-Dichloroethene	10	< 2	< 6	< 1	< 2	< 2	< 1	< 1			< 4	< 1			< 1	
1,1-Dichloroethane	< 1	< 2	< 6	< 1	< 2	4	3	1			19	< 1			< 1	
Cis-1,2 Dichloroethene	< 1	< 2	< 6	< 1	< 2	< 2	< 1	1			< 4	< 1			< 1	
1,1,1-Trichloroethane	< 1	< 2	< 6	< 1	14	3	1	14			** 1000	22			< 1	
Trichloroethene	< 1	< 2	< 6	< 1	< 2	< 2	< 1	5			32	< 1			2	
Tetrachloroethene	< 1	< 2	< 6	< 1	< 2	< 2	< 1	12			23	< 1			< 1	
Total VOCs	< 16	< 14	< 42	< 7	< 26	< 17	< 9	< 35	< 0	< 0	<** 1086	< 28	< 0	< 0	< 8	< 0
TOTAL 1,2-DCE	< 11	< 4	< 12	< 2	< 4	< 4	< 2	< 2	< 0	< 0	< 8	< 2	< 0	< 0	< 2	< 0

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Sample ID	SG9-10-275	SG9-10-276	SG9-10-277	SG9-10-278	SG9-10-279	SG9-10-280	SG9-10-281	SG9-10-282	SG9-10-283	SG9-10-284
Compound (µg/L)										
Benzene		3	< 1	< 1	< 1	2	< 1	81	5	6
Toluene		7	3	< 1	2	< 1	1	130	5	9
Ethylbenzene		4	2	2	< 1	< 1	< 1	95	20	7
Xylene isomers		22	8	6	5	4	4	** 991	95	31
Total BTEX	< 0	36	< 14	< 10	< 9	< 8	< 7	** 1297	125	53
Vinyl Chloride		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trans-1,2-Dichloroethene		< 1	< 1	< 1	< 1	< 1	< 1	4	< 1	< 1
1,1-Dichloroethane		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Cis-1,2 Dichloroethene		< 1	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1
1,1,1-Trichloroethane		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	11
Trichloroethene		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Tetrachloroethene		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
Total VOCs	< 0	< 7	< 7	< 7	< 7	< 7	< 7	< 10	< 8	< 18
TOTAL 1,2-DCE	< 0	< 2	< 2	< 2	< 2	< 2	< 2	< 5	< 3	< 2

Vinyl chloride and trans-1,2-dichloroethene co-elute, listed value represents total concentration for both compounds
** Results are estimated values only.

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/24/96	06/24/96	06/24/96	06/24/96	06/26/96	06/27/96	06/27/96	06/26/96	06/25/96
Sample Number	SB9/10-112(S)	SB9/10-112(D)	SB9/10-113(S)	SB9/10-113(D)	SB9/10-131(D)	SB9/10-122(S)	SB9/10-122(D)	SB9/10-131(S)	SB9/10-114(S)
Organic Traffic Report Number	EBGJ8	EBGJ9	EBGK0	EBGK1	EBGP3	EBGP4	EBGP5	EBGP2	EBGM2
Volatile Organics (ug/Kg)									
Methylene Chloride	11 BJU	10 BJU	12 BU	13 BU	6 J	8 J	12 BU	5 J	11 BU
Acetone	11 U	10 U	11 U	10 U	11 BJU	12 BJU	11 BJU	11 BJU	4 J
1,1-Dichloroethene	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
1,2-Dichloroethene (total)	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
2-Butanone	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
1,1,1-Trichloroethane	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
Trichloroethene	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
1,1,2-Trichloroethane	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
Tetrachloroethene	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
Toluene	11 U	1 J	11 U	10 U	11 U	12 U	11 U	11 U	1 J
Xylene	11 U	10 U	11 U	10 U	11 U	12 U	11 U	11 U	11 U
Semivolatile Organics (ug/Kg)									
Acenaphthene	350 U	340 U	360 U	390 U	340 U	360 UJ	350 U	340 U	410 U
Dibenzofuran	350 U	340 U	360 U	390 U	340 U	360 U	350 U	340 U	410 U
Fluorene	350 U	340 U	360 U	390 U	340 U	360 U	350 U	340 U	410 U
bis(2-Ethylhexyl)Phthalate	350 U	340 U	360 U	390 U	340 UJ	360 BJU	350 BJU	340 BJU	410 U
Pesticides & PCBs (ug/Kg)									
gamma-BHC (Lindane)	1.8 U	1.8 U	1.9 U	2 U	1.7 U	1.8 U	2.3	1.8 U	2.1 U
Aldrin	3.5 U	3.4 U	3.6 U	3.9 U	3.4 U	3.6 U	3.5 U	3.4 U	4.1 U
4,4'-DDT	3.5 U	3.4 U	3.6 U	3.9 U	3.4 U	6.4 J	3.5 U	3.4 U	4.1 U

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/25/96	06/28/96	06/28/96	06/28/96	06/20/96	06/20/96	06/19/96	06/29/96	06/29/96
Sample Number	SB9/10-114(D)	SB9/10-124(D)	SB9/10-124(S)	SB9/10-201	SB9/10-107(D)	SB9/10-107(S)	SB9/10-104(D)	SB9/10-104(S)	SB9/10-103(D)
Organic Traffic Report Number	EBGM3	EBGR0	EBGR1	EBGR2	EBGG9	EBGH0	EBGG2	EBGG1	EBGG0
Volatile Organics (ug/Kg)									
Methylene Chloride	12 BU	14 BU	11 BJU	19 BU	15 BU	14 BU	17 BU	17 BU	17 BU
Acetone	5 J	10 U	11 U	12 BJU	11 BJU	10 BJU	11 BJU	13 BU	10 BJU
1,1-Dichloroethene	11 U	10 U	11 U	12 U	11 U	10 U	11 U	11 U	10 U
1,2-Dichloroethene (total)	11 U	10 U	11 U	5 J	11 U	10 U	11 U	11 U	10 U
2-Butanone	11 U	10 UJ	11 U	12 UJ	11 U	10 U	11 U	11 U	10 U
1,1,1-Trichloroethane	11 U	10 U	11 U	5 J	11 U	10 U	11 U	11 U	10 U
Trichloroethene	11 U	10 U	11 U	12 U	11 U	10 U	11 U	11 U	10 U
1,1,2-Trichloroethane	11 U	10 U	11 U	12 U	11 U	10 U	11 U	11 U	10 U
Tetrachloroethene	11 U	10 U	11 U	12 U	11 U	10 U	11 U	11 U	10 U
Toluene	11 U	10 U	11 U	12 U	11 U	10 U	11 U	11 U	10 U
Xylene	11 U	10 U	11 U	12 U	11 U	10 U	11 U	11 U	10 U
Semivolatile Organics (ug/Kg)									
Acenaphthene	380 U	340 U	350 U	390 U	380 U	350 U	420 U	8300 U	220 J
Dibenzofuran	380 U	340 U	350 U	390 U	380 U	350 U	420 U	8300 U	150 J
Fluorene	380 U	340 U	350 U	390 U	380 U	350 U	420 U	8300 U	120 J
bis(2-Ethylhexyl)Phthalate	380 U	340 U	350 U	70 J	44 J	78 J	420 BJU	25000 BU	340 BJU
Pesticides & PCBs (ug/Kg)									
gamma-BHC (Lindane)	1.9 UJ	1.8 U	1.8 U	2 U	2 U	1.8 U	2.1 U	1.7 U	1.8 U
in	3.8 U	3.4 U	3.4 U	3.9 U	3.8 U	3.6 U	4.1 U	3.8	3.4 U
-DDT	3.8 U	3.4 U	3.4 U	3.9 U	3.8 U	3.6 U	4.1 U	3.3 U	3.4 U

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/19/96	06/21/96	06/21/96	06/21/96	06/21/96	06/27/96	06/27/96	06/27/96	06/27/96
Sample Number	SB9/10-103(S)	SB9/10-108(S)	SB9/10-108(D)	SB9/10-106(S)	SB9/10-106(D)	SB9/10-123(S)	SB9/10-123(D)	SB9/10-139(D)	SB9/10-123(S)-D
Organic Traffic Report Number	EBGF9	EBGH3	EBGH4	EBGH5	EBGH6	EBGP9	EBGQ0	EBGQ1	EBGQ2
Volatile Organics (ug/Kg)									
Methylene Chloride	11 BU	13 BU	11 BJU	11 BJU	10 BJU	11 BU	12 BU	13 BU	13 BU
Acetone	8 J	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	11 U	11 U	11 U	11 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ
1,1,1-Trichloroethane	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
Toluene	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
Xylene	11 U	11 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U
Semivolatile Organics (ug/Kg)									
Acenaphthene	340 U	350 U	350 U	6900 U	6900 U				
Dibenzofuran	340 U	350 U	350 U	6900 U	6900 U				
Fluorene	340 U	350 U	350 U	6900 U	6900 U				
bis(2-Ethylhexyl)Phthalate	340 BJU	45 J	350 U	6900 BJ	6900 U				
Pesticides & PCBs (ug/Kg)									
ɲma-BHC (Lindane)	1.7 U	1.8 U	1.8 U	1.8 U	1.7 U				
Endrin	3.4 U	3.5 U	3.5 U	3.4 U	3.4 U				
4;4'-DDT	3.4 U	3.5 U	3.5 U	3.4 U	3.4 U				

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/27/96	06/27/96	07/01/96	07/02/96	06/24/96	06/24/96	06/24/96	06/24/96	06/27/96
Sample Number	SB9/10-132(D)	SB9/10-140(S)	SB9/10-202-18	SB9/10-203-22	SB9/10-110(S)	SB9/10-110(D)	SB9/10-111(S)	SB9/10-111(D)	SB9/10-132(S)
Organic Traffic Report Number	EBGQ3	EBGP7	EBGR4	EBGR8	EBGJ4	EBGJ5	EBGJ6	EBGJ7	EBGP6
Volatile Organics (ug/Kg)									
Methylene Chloride	10 BJU	14 BU	12 BU	12 JBU	10 BJU	11 BJU	17 BU	20 BU	12 BU
Acetone	10 U	10 BJU	29 BU	12 BU	10 U	11 U	10 U	10 U	10 BJU
1,1-Dichloroethene	10 U	10 U	12 UJ	12 U	10 U	11 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	12 U	12 U	10 U	11 U	10 U	10 U	10 U
2-Butanone	10 UJ	4 J	5 J	12 U	10 U	11 U	10 U	10 U	10 UJ
1,1,1-Trichloroethane	10 U	10 U	12 U	1 J	10 U	11 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	12 U	12 U	10 U	11 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	12 U	12 U	10 U	11 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	12 U	8 J	10 U	11 U	10 U	10 U	10 U
Toluene	10 U	10 U	12 JBU	12 JBU	10 U	11 U	10 U	10 U	10 U
Xylene	10 U	10 U	12 U	12 U	10 U	11 U	10 U	10 U	10 U
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
gamma-BHC (Lindane)									
[illegible]n									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/26/96	06/26/96	06/26/96	06/26/96	06/26/96	06/26/96	06/26/96	06/26/96	06/26/96
Sample Number	SB9/10-118(D)	SB9/10-117(S)	SB9/10-117(D)	SB9/10-116(S)	SB9/10-116(D)	SB9/10-130(S)	SB9/10-120(S)	SB9/10-130(D)	SB9/10-118(S)-D
Organic Traffic Report Number	EBGM9	EBGN0	EBGN1	EBGN2	EBGN3	EBGN4	EBGN5	EBGN6	EBGN7
Volatile Organics (ug/Kg)									
Methylene Chloride	5 J	6 J	6 J	6 J	10 BJU	5 J	5 J	5 J	6 J
Acetone	11 BJU	10 BJU	12 BJU	11 BJU	10 U	10 BJU	10 BJU	10 BJU	13 BJU
1,1-Dichloroethene	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
1,2-Dichloroethene (total)	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
2-Butanone	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
1,1,1-Trichloroethane	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
Trichloroethene	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
1,1,2-Trichloroethane	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
Tetrachloroethene	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
Toluene	11 U	10 U	2 J	11 U	10 U	10 U	10 U	10 U	1 J
Xylene	11 U	10 U	12 U	11 U	10 U	10 U	10 U	10 U	13 U
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
gamma-BHC (Lindane)									
Endrin									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/26/96	06/26/96	06/26/96	06/25/96	06/25/96	06/25/96	06/25/96	06/25/96	06/25/96
Sample Number	SB9/10-119(S)	SB9/10-119(D)	SB9/10-120(D)	SB9/10-129(S)	SB9/10-129(D)	SB9/10-126(S)	SB9/10-126(D)	SB9/10-128(S)	SB9/10-128(D)
Organic Traffic Report Number	EBGN8	EBGN9	EBGP0	EBGL5	EBGL6	EBGL7	EBGL8	EBGM4	EBGM5
Volatile Organics (ug/Kg)									
Methylene Chloride	5 J	5 J	6 J	12 BU	13 BU	10 BJU	13 BU	10 BJU	11 BJU
Acetone	11 BJU	11 BJU	11 BJU	6 J	4 J	2 J	6 J	10 BJU	11 BJU
1,1-Dichloroethene	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
1,2-Dichloroethene (total)	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
2-Butanone	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 UJ	5 J
1,1,1-Trichloroethane	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
Trichloroethene	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
1,1,2-Trichloroethane	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
Tetrachloroethene	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
Toluene	2 J	4 J	11 U	5 J	11 U	10 U	6 J	10 U	11 U
Xylene	11 U	11 U	11 U	12 U	11 U	10 U	12 U	10 U	11 U
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
gamma-BHC (Lindane)									
Endrin									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/26/96	06/26/96	06/26/96	06/26/96	06/24/96	06/24/96	06/25/96	06/25/96	06/25/96
Sample Number	SB9/10-121(S)	SB9/10-121(D)	SB9/10-115(S)	SB9/10-118(S)	SB9/10-115(S)-D	SB9/10-115(D)	SB9/10-127(S)	SB9/10-127(D)	SB9/10-125(S)
Organic Traffic Report Number	EBGM6	EBGM7	EBGK8	EBGM8	EBGK9	EBGL0	EBGL1	EBGL2	EBGL3
Volatile Organics (ug/Kg)									
Methylene Chloride	10 BJU	10 BJU	110 BJU	10 BJU	120 BJU	1500 BU	14 BU	15 BU	11 BU
Acetone	10 BJU	10 BJU	110 U	10 BJU	120 U	1400 U	11 U	3 J	2 J
1,1-Dichloroethene	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
2-Butanone	10 UJ	10 UJ	110 U	4 J	120 U	1400 U	11 U	12 U	10 U
1,1,1-Trichloroethane	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
Trichloroethene	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
1,1,2-Trichloroethane	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
Tetrachloroethene	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
Toluene	10 U	10 U	11 J	10 U	13 J	1400 U	3 J	18	3 J
Xylene	10 U	10 U	110 U	10 U	120 U	1400 U	11 U	12 U	10 U
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
[illegible]na-BHC (Lindane)									
[illegible]ldrin									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/25/96	06/27/96	06/27/96	06/28/96	06/28/96	06/28/96	06/28/96	07/09/96	07/09/96
Sample Number	SB9/10-125(D)	SB9/10-139(S)	SB9/10-140(D)	SB9/10-142(D)	SB9/10-141(D)	SB9/10-141(S)	SB9/10-141(S)-D	SB9/10-205-5	SB9/10-204-18
Organic Traffic Report Number	EBGL4	EBGQ4	EBGQ5	EBGQ6	EBGQ7	EBGQ8	EBGQ9	EBGS5	EBGS0
Volatile Organics (ug/Kg)									
Methylene Chloride	12 BU	12 BU	14 BU	15 BU	10 BJU	10 BJU	14 BU	10 J	10 J
Acetone	9 J	10 U	5 J	11 U	10 U	10 U	11 U	9 J	11
1,1-Dichloroethene	10 U	10 U	10 U	11 U	10 U	10 U	11 U	2 J	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	11 U	10 U	10 U	11 U	86 B	10 UJB
2-Butanone	10 U	10 UJ	10 UJ	11 UJ	10 UJ	10 U	11 UJ	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	11 U	10 U	10 U	11 U	50	10 U
Trichloroethene	10 U	10 U	10 U	11 U	10 U	10 U	11 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	11 U	10 U	10 U	11 U	6 J	10 U
Tetrachloroethene	10 U	10 U	10 U	11 U	10 U	10 U	11 U	10 U	10 U
Toluene	1 J	10 U	10 U	11 U	10 U	10 U	11 U	10 U	10 U
Xylene	10 U	10 U	10 U	11 U	10 U	10 U	11 U	10 U	4 J
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
gamma-BHC (Lindane)									
Endrin									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	07/10/96	07/10/96	07/10/96	07/10/96	07/10/96	07/10/96	06/20/96	06/20/96	06/20/96
Sample Number	SB9/10-134(S)	SB9/10-134(D)	SB9/10-135(S)	SB9/10-135(D)	SB9/10-137(S)	SB9/10-137(D)	SB9/10-105(D)	SB9/10-105(S)	SB9/10-101(D)
Organic Traffic Report Number	EBGS6	EBGS7	EBGS8	EBGS9	EBGT0	EBGT1	EBGG8	EBGG7	EBGG4
Volatile Organics (ug/Kg)									
Methylene Chloride	4 J	48	3 J	3 J	3 J	3 J	18 BU	17 BU	10 BJU
Acetone	10 U	10 UJ	10 U	10 U	10 U	11 U	11 BJU	10 BJU	8 J
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	11 U	11 U	10 U	10 U
1,2-Dichloroethene (total)	10 UJB	10 U	10 UJB	10 UJB	10 UJB	11 UJB	11 U	10 U	10 U
2-Butanone	10 U	10 UJ	10 U	10 U	10 U	11 U	11 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	2 J	10 U	11 U	11 U	10 U	10 U
Trichloroethene	1 J	10 U	1 J	2 J	2 J	11 U	11 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	11 U	11 U	10 U	10 U
Tetrachloroethene	20	10 U	7 J	46	2 J	11 U	11 U	10 U	10 U
Toluene	10 U	10 U	10 U	3 J	10 U	11 U	11 U	10 U	10 U
Xylene	10 U	10 U	10 U	10 U	10 U	11 U	11 U	10 U	10 U
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
[illegible]ia-BHC (Lindane)									
[illegible]ndrin									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	07/10/96	07/10/96	07/10/96	07/10/96	07/10/96	07/10/96	06/20/96	06/20/96	06/20/96
Sample Number	SB9/10-134(S)	SB9/10-134(D)	SB9/10-135(S)	SB9/10-135(D)	SB9/10-137(S)	SB9/10-137(D)	SB9/10-105(D)	SB9/10-105(S)	SB9/10-101(D)
Organic Traffic Report Number	EBGS6	EBGS7	EBGS8	EBGS9	EBGT0	EBGT1	EBGG8	EBGG7	EBGG4
Volatile Organics (ug/Kg)									
Methylene Chloride	4 J	48	3 J	3 J	3 J	3 J	18 BU	17 BU	10 BJU
Acetone	10 U	10 UJ	10 U	10 U	10 U	11 U	11 BJU	10 BJU	8 J
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	11 U	11 U	10 U	10 U
1,2-Dichloroethene (total)	10 UJB	10 U	10 UJB	10 UJB	10 UJB	11 UJB	11 U	10 U	10 U
2-Butanone	10 U	10 UJ	10 U	10 U	10 U	11 U	11 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	2 J	10 U	11 U	11 U	10 U	10 U
Trichloroethene	1 J	10 U	1 J	2 J	2 J	11 U	11 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	11 U	11 U	10 U	10 U
Tetrachloroethene	20	10 U	7 J	46	2 J	11 U	11 U	10 U	10 U
Toluene	10 U	10 U	10 U	3 J	10 U	11 U	11 U	10 U	10 U
Xylene	10 U	10 U	10 U	10 U	10 U	11 U	11 U	10 U	10 U
Semivolatile Organics (ug/Kg)									
Acenaphthene									
Dibenzofuran									
Fluorene									
bis(2-Ethylhexyl)Phthalate									
Pesticides & PCBs (ug/Kg)									
a-BHC (Lindane)									
[illegible]drin									
4,4'-DDT									

Southeast Rockford Hits Table - Organic Sub-surface Soil Boring Sample Analysis - Area 9/10

Date Sampled	06/20/96	06/20/96	06/20/96	06/27/96	06/20/96	06/20/96
Sample Number	SB9/10-101(S)	SB9/10-109(S)	SB9/10-109(D)	SB9/10-142(S)	SB9/10-102(D)	SB9/10-102(S)
Organic Traffic Report Number	EBGG3	EBGH1	EBGH2	EBGP8	EBGG6	EBGG5
Volatile Organics (ug/Kg)						
Methylene Chloride	10 BJU	22 BU	11 BJU	16 BU	10 BJU	11 BJU
Acetone	10 U	11 BJU	11 U	11 BJU	10 U	11 U
1,1-Dichloroethene	10 U	11 U	11 U	11 U	10 U	11 U
1,2-Dichloroethene (total)	10 U	11 U	11 U	11 U	10 U	11 U
2-Butanone	10 U	11 U	11 U	11 UJ	10 U	11 U
1,1,1-Trichloroethane	10 U	11 U	11 U	11 U	10 U	11 U
Trichloroethene	10 U	11 U	11 U	11 U	10 U	11 U
1,1,2-Trichloroethane	10 U	11 U	11 U	11 U	10 U	11 U
Tetrachloroethene	10 U	11 U	11 U	11 U	10 U	11 U
Toluene	10 U	11 U	11 U	11 U	10 U	11 U
Xylene	10 U	11 U	11 U	11 U	10 U	11 U
Semivolatile Organics (ug/Kg)						
Acenaphthene						
Dibenzofuran						
Fluorene						
bis(2-Ethylhexyl)Phthalate						
Pesticides & PCBs (ug/Kg)						
...ha-BHC (Lindane)						
...ndrin						
4,4'-DDT						

Southeast Rockford Hits Table - Inorganic Sub-surface Soil Boring Sample Analysis - Area 9/10

	Date Sampled	07/09/96		07/08/96		07/01/96		07/02/96	
	Sample Number	SB9/10-205-5		SB9/10-204-18		SB9/10-202-18		SB9/10-203-22	
	Inorganic Traffic Report Number	MEAPL5		MEAPM0		MEAPL4		MEAPL8	
Inorganics (mg/Kg)									
Aluminum		1180		836		1080	*	957	*
Antimony		0.69	U	0.66	U	4.5	BN	3.8	BN
Arsenic		0.67	B	0.91	B	0.75	B	0.81	B
Barium		4.7	B	4.7	B	5.3	B	4.5	B
Beryllium		0.06	B	0.07	B	0.09	B	0.09	U
Cadmium		0.1	B	0.07	B	0.56	U	0.55	U
Calcium		43500		51300		71100		42900	
Chromium		4.4		3.7		5.3	*	3.1	*
Cobalt		1.3	B	1.3	B	1.6	B	1.2	B
Copper		3.5	B	3.3	B	6.3		2.8	B
Iron		3090		2790		3530	*	2600	*
Lead		2		1.6		2		1.5	
Magnesium		18100		19300		29000	*	17100	*
Manganese		89.3		123		121		79.6	
Nickel		3.5	B	3.1	B	3.1	B	3.6	B
Potassium		215	B	145	B	111	B	146	B
Sodium		65.2	B	86.6	B	151	B	113	B
Thallium		0.65	B	0.63	B	0.16	B	0.16	B
Vanadium		4.4	B	4.2	B	7.2	B	5.1	B
C		7.7		6.9		9.1		6.6	
Cyanide		0.04	U	5.5		0.22	B	0.17	B

Southeast Rockford Hits Table - Organic Surface Soil Analysis - Area 9/10

Date Sampled	06/25/96		06/25/96		06/25/96		06/25/96	
Sample Number	SS9/10-104		SS9/10-102		SS9/10-101		SS9/10-103	
Organic Traffic Report Number	EBGK7		EBGK4		EBGK5		EBGK6	
Volatile Organics (ug/Kg)								
Methylene Chloride	11	BJU	2	J	3	J	12	BUJ
Toluene	11	UJ	11	U	10	U	12	UJ
Semivolatile Organics (ug/Kg)								
Naphthalene	1500	U	430	U	1700	U	320	J
2-Methylnaphthalene	1500	U	430	U	1700	U	250	J
Acenaphthene	350	J	430	U	1700	U	200	J
Dibenzofuran	190	J	430	U	1700	U	1800	U
Fluorene	340	J	430	U	1700	U	190	J
Phenanthrene	3600	J	400	J	2100	J	2600	J
Anthracene	640	J	55	J	190	J	540	J
Carbazole	530	J	59	J	250	J	340	J
Di-n-Butylphthalate	1600	J	430	U	1700	U	1200	J
Fluoranthene	4800	J	650		4400	J	4200	J
Pyrene	4200	J	580		3400	J	3500	J
Butylbenzylphthalate	1500	U	60	J	1700	U	660	J
Benzo(a)anthracene	2300	J	330	J	1400	J	1900	J
Chrysene	2100	J	310	J	1800	J	1900	J
bis(2-Ethylhexyl)Phthalate	3900	J	130	J	460	J	7400	J
ızo (b) Fluoranthene	2800	J	420	J	2700	J	2800	J
Benzo (k) Fluoranthene	740	J	220	J	790	J	890	J
Benzo (a) Pyrene	1700	J	260	J	1600	J	1700	J
Ideno (1,2,3-cd) Pyrene	1200	J	230	J	1000	J	1300	J
Benzo (g,h,i) Perylene	1300	J	270	J	1100	J	1400	J
Pesticides & PCBs (ug/Kg)								
Heptachlor epoxide	1.9	U	2.5		1.8	U	1.9	U
Dieldrin	4.1	PJ	54	P	3.4	U	3.6	U
4,4'-DDE	17	J	4.3	U	3.4	U	3.6	U
4,4'-DDD	7.1	J	4.3	U	3.4	U	3.6	U
4,4'-DDT	41	J	4.3	U	3.4	U	7	J
gamma-Chlordane	2	PJ	2.2	U	1.8	U	1.9	U
Aroclor-1254	30	J	43	U	34	U	36	U

Southeast Rockford Hits Table - Inorganic Surface Soil Sample Analysis - Area 9/10

Date Sampled	06/25/96	06/25/96	06/25/96	06/25/96
Sample Number	SS9/10-102	SS9/10-101	SS9/10-103	SS9/10-104
Inorganic Traffic Report Number	MEAPK4	MEAPK5	MEAPK6	MEAPK7
Inorganics (mg/Kg)				
Aluminum	11800	3220	4830	5190
Arsenic	5.1	1.9 B	25	5.3
Barium	153	37.4 B	89.7	67.9
Beryllium	0.23 BJ	0.1 BJ	0.13 BJ	0.13 BJ
Cadmium	0.22 U	0.2 U	0.47 B	0.95 B
Calcium	15700	6430	50100	9130
Chromium	16.2	5.6	16.1	14.5
Cobalt	6.1 B	2.5 B	4.7 B	4 B
Copper	18.8	9.9	44.5	37.1
Iron	14700	6120	16600	12000
Lead	31.7	27.4	133	209
Magnesium	9400	3840	28800	4900
Manganese	649 JN	225 JN	377 JN	286 JN
Mercury	0.05 U	0.05 U	0.07 B	0.09 B
Nickel	10.8	4.3 B	10.3	10.2
Potassium	1440	363 B	656 B	531 B
Sodium	105 B	28.4 BJ	130 B	86.7 B
Vanadium	27.2	10.3	18.8	19.2
Zinc	139 JN	43.8 JN	287 JN	154 JN
anide	0.21 BJ	0.11 U	0.12 BJ	0.18 BJ

Southeast Rockford Hits Table - Organic Monitoring Well Sample Analysis

Date Sampled	07/16/96	07/16/96	07/16/96	07/16/96	07/16/96	07/16/96	07/16/96	07/17/96
Sample Number	TRBLK1	MW-202	MW-203	MW-201	MW-201-D	MW-5	MW-5-B	MW-4
Organic Traffic Report Number	EBGT2	EBGT3	EBGT4	EBGT5	EBGT6	EBGT7	EBGT8	EBGT9
Volatile Organics (ug/L)								
1,1-Dichloroethene	10 U	10 U	10 U	850	790	2 J	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	690	640	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	4500	4600	10 U	10 U	10 U
1,1,1-Trichloroethane	10 U	5 J	2 J	12000	12000	20	2 J	2 J
Trichloroethene	10 U	10 U	10 U	620 U	620 U	2 J	10 U	40
Tetrachloroethene	10 U	12	7 J	68 J	620 U	4 J	10 U	1 J
Toluene	10 U	10 U	10 U	94 J	89 J	10 U	10 U	10 U
Xylene	10 U	10 U	10 U	76 J	75 J	10 U	10 U	10 U

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BOREHOLE LOG
SB9/10-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 729
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 101
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 32
Drilling Date: Start 6/27/96 **End** 6/28/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed E Not Surveyed
Logged By: SNEHAL S. BHAGAT and ANDREW R. KEAR

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					729.0 0		0'-0.3': Gravel FILL;
SS	SB9/10-201-001	3.4	15"/24"	4;2; 2;1;			0.3'-6.8': Dark brown, well sorted, med. SAND; clayey; dry; some gravel 5'-6.8';
SS	SB9/10-201-002	4.4	16"/24"	1;1; 2;2;			
SS	SB9/10-201-003	2.6	19"/24"	1;2; 2;6;	724.0 5		
SS	SB9/10-201-004	1.1	15"/24"	3;3; 3;3;			6.8'-10.6': Brown, well sorted, med. to coarse SAND; dry;
SS	SB9/10-201-005	2.4	15"/24"	2;4; 5;12;	719.0 10		
SS	SB9/10-201-006	3.8	18"/24"	7;9; 9;10;			10.6'-16.6': Brown, gravelly, coarse SAND; dry;
SS	SB9/10-201-007	1.7	15"/24"	5;7; 19;12;			
SS	SB9/10-201-008	3.9	14"/24"	4;7; 8;10;	714.0 15		
SS	SB9/10-201-009	3.1	20"/24"	3;5; 8;7;			16.6'-20.6': Brown, well sorted, coarse SAND;
SS	SB9/10-201-010	4.0	15"/24"	2;2; 3;3;	709.0 20		
SS	SB9/10-201-011	4.5	18"/24"	2;4; 6;8;			20.6'-30.8': Brown, well sorted, med. SAND; moist;
SS	SB9/10-201-012	3.3	20"/24"	4;5; 9;10;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

CAMP DRESSER & McKEE
CDM
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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-201-013	2.4	18"/24"	7;7; 12;14;			
SS	SB9/10-201-014	3.9	18"/24"	6;6; 9;10;			
SS	SB9/10-201-015	3.0	18"/24"	3;4; 7;8;	699.0 30		
SS	SB9/10-201-016	4.2	15"/24"	8;13; 13;10;			30.8'-32.7': Brown, well sorted, coarse SAND; trace gravel; Saturated at 32';
SS	SB9/10-201-017	8.8	16"/24"	6;12; 13;10;			32.7'-34.7': Brown, coarse SAND and GRAVEL;
SS	SB9/10-201-018	2.8	18"/24"	1;2; 2;2;	694.0 35		34.7'-38.6': Brown, med. to coarse SAND; some gravel;
SS	SB9/10-201-019	46	15"/24"	7;12; 22;25;			
SS	SB9/10-201-020	36	14"/24"	13;24; 20;13;	689.0 40		38.6'-44.8': Brown/gray, gravelly, coarse SAND; Sample SB9/10-201-022 tested negative for NAPL using Sudan IV dye;
SS	SB9/10-201-021	52	14"/24"	6;10; 14;15;			
SS	SB9/10-201-022	64	18"/24"	8;16; 18;13;			
SS	SB9/10-201-023	9.6	14"/24"	7;7; 11;13;	684.0 45		44.8'-48.4': Gray, gravelly, coarse SAND;
SS	SB9/10-201-024	9.4	10"/24"	10;18; 19;18;			
SS	SB9/10-201-025	7.0	13"/24"	13;13; 14;13;	679.0 50		48.4'-54.6': Gray/brown, gravelly, coarse SAND;
SS	SB9/10-201-026	4.0	11"/24"	8;6; 7;7;			
SS	SB9/10-201-027	2.6	13"/24"	10;12; 15;16;			
SS	SB9/10-201-028	7.2	14"/24"	9;17; 21;21;	674.0 55		54.6'-64.6': Brown, fine to med. to coarse SAND; some gravel;
SS	SB9/10-201-029	7.0	13"/24"	12;20; 26;28;			
SS	SB9/10-201-030	2.4	18"/24"	13;13; 13;14;	669.0 60		
SS	SB9/10-201-031	6.6	13"/24"	13;15; 13;12;			
SS	SB9/10-201-032	5.2	13"/24"	9;11; 12;12;			

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BOREHOLE LOG
SB9/10-201

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-201-033	3.4	15"/24"	9;12; 13;14;			64.6'-70.6': Brown, gravelly, coarse SAND;
SS	SB9/10-201-034	3.4	16"/24"	8;12; 15;18;			
SS	SB9/10-201-035	1.4	13"/24"	8;12; 18;16;	659.0 70		
SS	SB9/10-201-036	1.0	12"/24"	13;17; 20;16;			70.6'-78.6': Brown, fine to med. SAND;
SS	SB9/10-201-037	3.0	16"/24"	6;9; 18;21;			
SS	SB9/10-201-038	2.0	14"/24"	15;17; 18;20;	654.0 75		
SS	SB9/10-201-039	1.4	14"/24"	8;11; 19;24;			
SS	SB9/10-201-040	4.2	13"/24"	14;15; 13;13;	649.0 80		78.6'-82.6': Brown, med. to coarse SAND;
SS	SB9/10-201-041	7.4	13"/24"	12;19; 22;20;			
SS	SB9/10-201-042	7.8	17"/24"	9;21; 32;44;			82.6'-96.9': Brown, fine SAND; trace gravel from 95'-96.9';
SS	SB9/10-201-043	0.6	18"/24"	16;17; 19;19;	644.0 85		
SS	SB9/10-201-044	5.8	18"/24"	15;27; 31;30;			
SS	SB9/10-201-045	2.4	19"/24"	13;18; 24;28;	639.0 90		
SS	SB9/10-201-046	1.4	20"/24"	14;16; 18;30;			
SS	SB9/10-201-047	3.6	19"/24"	14;25; 27;27;			
SS	SB9/10-201-048	4.4	22"/24"	13;25; 24;26;	634.0 95		
SS	SB9/10-201-049	2.6	18"/24"	19;37; 39;32;			98.9'-100.8': Brown, gravelly, coarse SAND;
SS	SB9/10-201-050	2.8	22"/24"	21;35; 48;43;	629.0 100		
							101': Bottom of Boring

CAMP DRESSER & McKEE
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BOREHOLE LOG
SB9/10-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 730
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 80
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 33
Drilling Date: Start 7/1/96 End 7/2/96
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed E Not Surveyed
Logged By: ANDREW R. KEAR

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					730.0 0		0'-1': Asphalt (0-3"); Cobbles;
SS	SB9/10-202-001	0.2	15"/24"	3;2; 2;1;			1'-8': Dark brown/black, sandy CLAY w/brick fragments;
SS	SB9/10-202-002	0.1	14"/24"	1;1; 1;1;			
SS	SB9/10-202-003	0.2	18"/24"	WOH;1; 1;WOH;	725.0 5		
SS	SB9/10-202-004	1.4	17"/24"	WOH;1; 3;3;			8'-11': Lt. brown/orange medium SAND; some gravel, damp;
SS	SB9/10-202-005	1.5	18"/24"	2;3; 2;2;	720.0 10		
SS	SB9/10-202-006	1.5	14"/24"	2;2; 1;1;			11'-15': Lt. brown/brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-202-007	0.8	22"/24"	1;2; 1;2;			
SS	SB9/10-202-008	1.4	15"/24"	2;1; 1;1;	715.0 15		15'-25': Brown, fine to med. SAND;
SS	SB9/10-202-009	1.3	23"/24"	2;2; 2;4;			w/trace gravel (17'-19');
SS	SB9/10-202-010	1.0	20"/24"	4;4; 6;6;	710.0 20		
SS	SB9/10-202-011	0.4	23"/24"	2;4; 4;6;			
SS	SB9/10-202-012	1.0	18"/24"	3;4; 5;10;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

SB9/10-202 is located near soil gas point SG9/10-126.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev./ Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-202-013	1.2	19"/24"	9;14; 18;17;			25'-29': Brown, fine SAND;
SS	SB9/10-202-014	1.6	23"/24'	8;5; 6;8;			
SS	SB9/10-202-015	1.8	23"/24'	3;6; 12;12;	700.0 30		29'-33': Brown, med. SAND; trace gravel;
SS	SB9/10-202-016	2.4	20"/24'	8;12; 17;20;			Saturated at 33';
SS	SB9/10-202-017	2.6	17"/24"	8;9; 9;10;			33'-40': Brown, med-coarse SAND; trace gravel;
SS	SB9/10-202-018	5.8	14"/24"	5;6; 9;13;	695.0 35		35'-37': Soil sample collected for laboratory analysis (Sudan IV dye test negative for NAPL);
SS	SB9/10-202-019	4.6	15"/24"	9;14; 14;13;			
SS	SB9/10-202-020	3.2	15"/24"	8;5; 6;7;	690.0 40		39'-43': Brown, med-coarse SAND, w/some gravel;
SS	SB9/10-202-021	2.4	14"/24"	4;5; 14;11;			w/ trace gravel (41'-43');
SS	SB9/10-202-022	0.4	14"/24"	4;6; 8;10;			43'-45': Brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-202-023	3.0	15"/24"	5;13; 17;15;	685.0 45		45'-49': Brown, med-coarse SAND, w/trace gravel;
SS	SB9/10-202-024	3.2	16"/24"	9;13; 14;17;			47'-49': Brown, med-coarse SAND, w/trace gravel and trace limestone cobbles;
SS	SB9/10-202-025	3.8	15"/24"	6;10; 18;20;	680.0 50		49'-53': Brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-202-026	2.4	14"/24"	7;13; 15;13;			
SS	SB9/10-202-027	4.0	14"/24"	7;12; 16;16;			53'-55': Brown, coarse SAND, w/gravel;
SS	SB9/10-202-028	1.8	15"/24"	8;10; 15;16;	675.0 55		55'-65.5': Brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-202-029	3.0	15"/24"	10;17; 17;11;			
SS	SB9/10-202-030	2.4	14"/24"	9;12; 19;19;	670.0 60		w/some gravel (59'-61');
SS	SB9/10-202-031	6.2	13"/24"	10;14; 19;24;			w/trace gravel (61'-63');

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BOREHOLE LOG
SB9/10-202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev./ Depth (ft.)	Graphic Log	Material Description
							65.5'-71.5': Brown, fine to med. SAND;
SS	SB9/10-202-032	4.2	15"/24"	9;13; 20;21;	660.0 70		
							71.5'-76.5': Brown, fine to med. SAND, w/trace gravel and cobbles;
SS	SB9/10-202-033	3.4	15"/24"	10;14; 15;19;	655.0 75		
							76.5'-80': Brown, fine to coarse SAND, w/gravel;
SS	SB9/10-202-034	2.0	14"/24"	9;10; 8;9;	650.0 80		
							80': Bottom of Boring
					645.0 85		
					640.0 90		
					635.0 95		
					630.0 100		

CAMP DRESSER & McKEE

CDM

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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-203

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 730
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 80
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 33
Drilling Date: Start 7/2/98 End 7/2/98
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed E Not Surveyed
Logged By: ANDREW R. KEAR

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					730.0 0		0'-1': Asphalt, crushed limestone FILL;
SS	SB9/10-203-001	2.2	18"/24"	1;2; 2;2;			1'-5': Dark brown to black, clayey, fine to med. SAND;
SS	SB9/10-203-002	1.0	14"/24"	2;2; 1;2;	725.0 5		
SS	SB9/10-203-003	1.4	10"/24"	2;1; 2;3;			5'-7': Dark brown, sandy CLAY;
SS	SB9/10-203-004	1.6	16"/24"	2;2; 3;3;			7'-11': Brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-203-005	1.6	18"/24"	2;2; 3;2;	720.0 10		
SS	SB9/10-203-006	2.2	16"/24"	2;2; 3;4;			11'-13': Lt. brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-203-007	1.6	17"/24"	3;4; 5;6;			13'-17': Lt. brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-203-008	2.2	17"/24"	4;6; 9;11;	715.0 15		
SS	SB9/10-203-009	2.0	20"/24"	2;4; 5;8;			17'-21': Lt. brown, fine SAND;
SS	SB9/10-203-010	2.6	20"/24"	3;4; 6;8;	710.0 20		
SS	SB9/10-203-011	1.2	20"/24"	4;6; 10;12;			21'-27': Lt. brown, fine to med. SAND; w/trace gravel (21'-23');
SS	SB9/10-203-012	1.2	20"/24"	5;11; 11;10;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

CAMP DRESSER & McKEE
CDM
233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-203

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-203-013	1.4	19"/24"	4;6; 7;11;			
SS	SB9/10-203-014	1.6	22"/24"	6;10; 10;11;			27'-31': Lt. brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-203-015	1.6	23"/24"	8;10; 11;12;	700.0 30		
SS	SB9/10-203-016	2.4	7"/24"	10;18; 25;25;			31'-33': Lt. brown, fine to coarse SAND, w/some gravel and trace limestone cobbles;
SS	SB9/10-203-017	3.0	20"/24"	4;9; 10;12;			33'-37': Brown, fine to coarse SAND, w/trace cobbles; Saturated at 33';
SS	SB9/10-203-018	3.6	16"/24"	4;6; 18;27;	695.0 35		
SS	SB9/10-203-019	1.8	14"/24"	12;22; 25;27;			37'-39': Brown, fine to med. SAND;
SS	SB9/10-203-020	42	14"/24"	6;6; 10;11;	690.0 40		39'-43': Brown, fine to coarse SAND, w/gravel and some cobbles;
SS	SB9/10-203-021	92	14"/24"	6;11; 13;13;			
SS	SB9/10-203-022	180	15"/24"	6;12; 16;18;			43'-45': Brown, fine to med. SAND, w/trace gravel;
SS	SB9/10-203-023	40	14"/24"	7;13; 14;16;	685.0 45		45'-49': Brown, fine to coarse SAND, w/gravel; Sample SB9/10-203-022 tested negative for NAPL using Sudan IV dye;
SS	SB9/10-203-024	26	15"/24"	7;14; 14;16;			
SS	SB9/10-203-025	24	17"/24"	10;17; 22;23;	680.0 50		49'-51': Brown, fine to med. SAND, w/some gravel;
SS	SB9/10-203-026	6.0	16"/24"	8;13; 22;21;			51'-53': Brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-203-027	5.6	16"/24"	8;11; 17;14;			53'-55': Brown, fine to med. SAND;
SS	SB9/10-203-028	1.6	16"/24"	10;11; 13;13;	675.0 55		55'-57': Brown, fine to coarse SAND;
SS	SB9/10-203-029	1.0	16"/24"	7;12; 15;15;			57'-66': Brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-203-030	0.8	15"/24"	8;11; 11;14;	670.0 60		
SS	SB9/10-203-031	2.4	15"/24"	9;12; 15;12;			

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BOREHOLE LOG
SB9/10-203

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-203-032	3.0	17"/24"	11;17; 24;34;	660.0 70		66'-71.5': Brown, fine to coarse SAND, w/trace gravel;
							71.5'-76.5': Brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-203-033	2.0	15"/24"	9;20; 23;20;	655.0 75		
							76.5'-80': Brown, fine to coarse SAND, w/gravel;
SS	SB9/10-203-034	1.4	17"/24"	11;12; 10;15;	650.0 80		
							80': Bottom of Boring
					645.0 85		
					640.0 90		
					635.0 95		
					630.0 100		

CAMP DRESSER & McKEE
CDM
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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-204

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 726
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 80
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 28.5
Drilling Date: Start 7/8/98 **End** 7/8/98
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed **E** Not Surveyed
Logged By: ANDREW R. KEAR

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					726.0 0		0'-1': Gravel FILL;
SS	SB9/10-204-001	5.0	24"/24"	2;2; 2;2;			1'-3': Dark brown, sandy CLAY, w/med. SAND (2.5'-3')
SS	SB9/10-204-002	3.8	18"/24"	2;4; 4;3;			3'-5': Brown/rust, fine to med. SAND, w/trace gravel;
SS	SB9/10-204-003	4.4	17"/24"	2;2; 2;2;	721.0 5		5'-7': Brown/rust, fine SAND;
SS	SB9/10-204-004	4.0	15"/24"	2;2; 1;2;			7'-9': Lt. to dark brown, fine to med. SAND;
SS	SB9/10-204-005	1.4	18"/24"	2;4; 7;7;	716.0 10		9'-11': Lt. brown, fine to coarse SAND, w/trace gravel;
SS	SB9/10-204-006	2.2	20"/24"	2;4; 6;6;			11'-27': Lt. brown, fine to med. SAND;
SS	SB9/10-204-007	2.4	20"/24"	2;3; 5;6;			
SS	SB9/10-204-008	1.6	19"/24"	5;5; 8;8;	711.0 15		
SS	SB9/10-204-009	2.0	20"/24"	3;5; 7;8;			
SS	SB9/10-204-010	1.8	19"/24"	3;4; 8;10;	706.0 20		
SS	SB9/10-204-011	1.4	22"/24"	3;5; 6;8;			
SS	SB9/10-204-012	1.6	22"/24"	5;8; 10;10;			

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

Organic vapor measurements collected from soil headspace.

SB9/10-204 is located 20 ft. west of soil gas point SG9/10-218.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

CAMP DRESSER & McKEE
CDM
233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-204

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-204-013	0.6	18"/24"	9;10; 10;11;			27'-29': Brown, fine to coarse SAND;
SS	SB9/10-204-014	0.4	20"/24"	5;10; 10;12;			Saturated at 28.5';
SS	SB9/10-204-015	3.4	20"/24"	4;5; 5;8;	696.0 30		29'-31': Brown, fine to coarse SAND, w/trace gravel;
SS	SB9/10-204-016	6.4	14/24"	9;15; 17;20;			31'-35': Brown, fine to coarse SAND;
SS	SB9/10-204-017	NA	NA	NA			Sample SB9/10-204-017 not collected;
SS	SB9/10-204-018	44	14"/24"	4;5; 8;12;	691.0 35		35'-37': Brown, fine to coarse SAND, w/trace gravel;
SS	SB9/10-204-019	18	12"/24"	3;6; 9;11;			37'-41': Brown, fine to coarse SAND;
SS	SB9/10-204-020	18	15"/24"	5;9; 10;12;	686.0 40		NOTE: Samples SB9/10-204-018 to -021 tested negative for NAPL using Sudan IV dye;
SS	SB9/10-204-021	28	13"/24"	7;3; 3;5;			41'-45': Brown, fine to coarse SAND w/gravel;
SS	SB9/10-204-022	10	14"/24"	4;9; 8;8;			41.5'-43.5': Black staining;
SS	SB9/10-204-023	2.0	14"/24"	8;9; 12;10;	681.0 45		45'-47': Brown, med. to coarse SAND w/gravel;
SS	SB9/10-204-024	4.6	14"/24"	4;7; 11;12;			47'-49': Brown, fine to med. SAND;
SS	SB9/10-204-025	2.0	15"/24"	6;12; 13;15;	676.0 50		49'-51': Brown, fine to coarse SAND;
SS	SB9/10-204-026	4.4	21"/24"	10;13; 20;21;			51'-55': Brown/gray, fine to coarse SAND;
SS	SB9/10-204-027	6.2	14"/24"	8;13; 15;17;	671.0 55		
SS	SB9/10-204-028	1.4	15"/24"	9;13; 18;19;			55'-57': Brown/gray, fine to coarse SAND, w/trace gravel;
SS	SB9/10-204-029	1.0	17"/24"	8;12; 14;15;			57'-59': Brown/gray, fine to coarse SAND;
SS	SB9/10-204-030	1.4	16"/24"	9;11; 15;18;	666.0 60		59'-61': Brown/gray, fine to coarse SAND, w/trace gravel;
SS	SB9/10-204-031	1.6	15"/24"	8;13; 16;18;			61'-68': Brown, fine to med. SAND, w/trace gravel;

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BOREHOLE LOG
SB9/10-204

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1881-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
SS	SB9/10-204-032	0.8	16"/24"	12;18; 16;17;	656.0 70		68'-80': Brown, fine to med. SAND;
SS	SB9/10-204-033	2.4	17"/24"	8;10; 16;20;	651.0 75		
SS	SB9/10-204-034	0.8	17"/24"	14;14; 20;22;	646.0 80		
							80': Bottom of Boring
					641.0 85		
					636.0 90		
					631.0 95		
					626.0 100		

CAMP DRESSER & McKEE
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BOREHOLE LOG
SB9/10-205

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 729
Drilling Method/Rig: HSA and MR/CME 75
Total Depth (ft. BGS): 55
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS):
Drilling Date: Start 7/9/98 End 7/9/98
Abandonment Method: Bentonite Grout
Borehole Coordinates:
Field Screening Instrument: Foxboro OVA 128
N Not Surveyed E Not Surveyed
Logged By: ANDREW R. KEAR

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
					729.0 0		0'-0.25': Asphalt; 0.25'-1.5': Dark brown, sandy CLAY; 1.5'-31': Brown, fine to coarse SAND;
					724.0 5		
					719.0 10		
AS					714.0 15		
					709.0 20		

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Surface elevation estimated from Rockford South Quadrangle (U.S. Geological Survey).

First split-spoon sample collected at 31'.

SB9/10-205 is located near soil gas point SG9/10-199.

Organic vapor measurements collected from soil headspace.

NAPL - Non-Aqueous Phase Liquid

Reviewed by: **Date:**

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CDM
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Chicago, Illinois 60606-6306

BOREHOLE LOG
SB9/10-205

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Recov./ Adv.	Blows per 6 Inches	Elev. Depth (ft.)	Graphic Log	Material Description
AS					699.0 30		
SS	SB9/10-205-001	16	18"/24"	7;8; 9;9;			31'-33': Brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-205-002	46	20"/24"	5;11; 17;17;	694.0 35		33'-35': Brown, gravelly, fine to coarse SAND;
SS	SB9/10-205-003	24	12"/24"	10;12; 16;18;			35'-37': Brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-205-004	66	17"/24"	8;10; 12;16;			37'-39': Brown, fine to med. SAND;
SS	SB9/10-205-005	160	18"/24"	10;9; 10;11;	689.0 40		39'-43': Brown, fine to coarse SAND, w/trace gravel (Sudan IV dye test negative for NAPL);
SS	SB9/10-205-006	94	18"/24"	7;9; 9;12;			
SS	SB9/10-205-007	110	14"/24"	7;9; 12;14;	684.0 45		43'-47': Brown, fine to coarse SAND, w/some gravel;
SS	SB9/10-205-008	90	14"/24"	8;9; 10;13;			
SS	SB9/10-205-009	50	13"/24"	7;9; 9;13;			47'-49': Brown, fine to coarse SAND w/gravel;
SS	SB9/10-205-010	18	16"/24"	9;9; 12;14;	679.0 50		49'-51': Brown, fine to coarse SAND, w/trace gravel;
SS	SB9/10-205-011	14	16"/24"	10;13; 13;13;			51'-55': Brown, fine to coarse SAND;
SS	SB9/10-205-012	10	13"/24"	10;10; 12;15;	674.0 55		
					669.0 60		55': Bottom of Boring

CAMP DRESSER & McKEE

CDM

233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

MONITORING WELL DETAIL

MW201

Client: ILLINOIS EPA

Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT

Project Location: ROCKFORD, ILLINOIS

Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.

Surface Elevation (ft. MSL): 729.26

Drilling Method/Rig: HSA/CME 75

Total Depth (ft. BGS): 48.0

Drillers: Dave Bowers, Scott Zeien

Depth to Initial Water Level (ft. BGS): 32.5

Drilling Date: **Start** 7/9/96 **End** 7/9/96

Development Method: Surge and pump with Grundfos pump

Well Coordinates:

Field Screening Instrument: Foxboro OVA 128

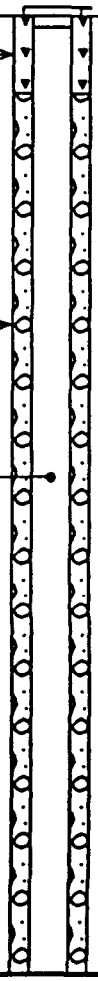
N 2031653.688 E 2591771.567

Logged By: ANDREW R. KEAR

Development Date: **Start** 7/11/96 **End** 7/11/96

Top of Riser Elevation (ft.): 729.03

Sample Type	Sample Number	Organic Vapor (ppm)	Blows per 6 Inches	Recov./ Adv.	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
					REFER TO BOREHOLE LOG SB9/10-201 FOR MATERIAL DESCRIPTIONS.		729.3 0	*Ground Surface*
							724.3 5	CEMENT
							719.3 10	Bentonite GROUT
							714.3 15	Type 304 Riser - Stainless Steel, 2" diam.
							709.3 20	



EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample

OTHER:
WOH - Weight of Hammer

REMARKS

Reviewed by: **Date:**

CAMP DRESSER & McKEE

CDM

233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

MONITORING WELL DETAIL

MW201

Client: ILLINOIS EPA

Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT

Project Location: ROCKFORD, ILLINOIS

Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Blows per 6 Inches	Recov./ Adv.	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
							699.3 30	Bentonite PELLETS; FINE SAND (#90)
							694.3 35	COARSE SAND (#20-#40)
							689.3 40	Screen - Type 304 Stainless Steel, 2" diam., 0.010" slot
							684.3 45	Bottom of Boring @48'
							679.3 50	
							674.3 55	
							669.3 60	

CAMP DRESSER & McKEE
CDM
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Chicago, Illinois 60606-6306

MONITORING WELL DETAIL

MW202

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 729.54
Drilling Method/Rig: HSA/CME 75
Total Depth (ft. BGS): 51.0
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 31.0
Drilling Date: Start 7/10/96 End 7/10/96
Development Method: Surge and pump with Grundfos pump
Well Coordinates:
Field Screening Instrument: Foxboro OVA 128
N 2032213.063 E 2592985.385
Logged By: ANDREW R. KEAR
Development Date: Start 7/11/96 End 7/11/96
Top of Riser Elevation (ft.): 729.62

Sample Type & #	Sample Number	Organic Vapor (ppm)	Blows per 6 Inches	Recov./ Adv.	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
					SAMPLES NOT COLLECTED.		729.5 0	Ground Surface
							724.5 5	CEMEMT
							719.5 10	Bentonite GROUT
							714.5 15	Type 304 Riser - Stainless Steel, 2" diam.
							709.5 20	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Reviewed by: **Date:**

CAMP DRESSER & McKEE

CDM

233 South Wacker Drive, Suite 450
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MONITORING WELL DETAIL

MW202

Client: ILLINOIS EPA

Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT

Project Location: ROCKFORD, ILLINOIS

Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Blows per 6 Inches	Recov./ Adv.	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
							699.5 30	
							694.5 35	Bentonite PELLETS
								FINE SAND (#90)
							689.5 40	
							684.5 45	COARSE SAND (#20-#40)
								Screen - Type 304 Stainless Steel, 2" diam., 0.010" slot
							679.5 50	Bottom of Boring @51'
							674.5 55	
							669.5 60	

CAMP DRESSER & McKEE

CDM

233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

MONITORING WELL DETAIL

MW203

Client: ILLINOIS EPA
Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT
Project Location: ROCKFORD, ILLINOIS
Project Number: 1681-11110-014.RI

Drilling Contractor: TERRACON CONSULTANTS, INC.
Surface Elevation (ft. MSL): 729.59
Drilling Method/Rig: HSA/CME 75
Total Depth (ft. BGS): 51.0
Drillers: Dave Bowers, Scott Zeien
Depth to Initial Water Level (ft. BGS): 31.0
Drilling Date: Start 7/11/96 End 7/11/96
Development Method: Surge and pump with Grundfos pump
Well Coordinates:
Field Screening Instrument: Foxboro OVA 128
N 2032079.038 E 2592993.400
Logged By: ANDREW R. KEAR
Development Date: Start 7/12/96 End 7/12/96
Top of Riser Elevation (ft.): 729.09

Sample Type	Sample Number	Organic Vapor (ppm)	Blows per 6 Inches	Recov./ Adv.	Material Description	Graphic Log	Elev. Depth (ft.)	Well Construction Detail
					SAMPLES NOT COLLECTED FROM 0'-39' BGS.		729.6 0 Ground Surface	CEMENT
							724.6 5	Bentonite GROUT
							719.6 10	Type 304 Riser - Stainless Steel, 2" diam.
							714.6 15	
							709.6 20	

EXPLANATION OF ABBREVIATIONS

DRILLING METHODS:
HSA - Hollow Stem Auger
SSA - Solid Stem Auger
HA - Hand Auger
AR - Air Rotary
DTR - Dual Tube Rotary
FR - Foam Rotary
MR - Mud Rotary
RC - Reverse Circulation
CT - Cable Tool
JET - Jetting
D - Driving
DTC - Drill Through Casing

SAMPLING TYPES:
AS - Auger/Grab Sample
CS - California Sampler
BX - 1.6" Rock Core
NX - 2.1" Rock Core
GP - Geoprobe
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
OTHER:
WOH - Weight of Hammer

REMARKS

Reviewed by: **Date:**

CAMP DRESSER & McKEE

CDM

233 South Wacker Drive, Suite 450
Chicago, Illinois 60606-6306

MONITORING WELL DETAIL

MW203

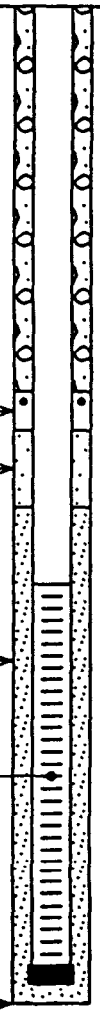
Client: ILLINOIS EPA

Project Name: SE ROCKFORD SOURCE CONTROL OPERABLE UNIT

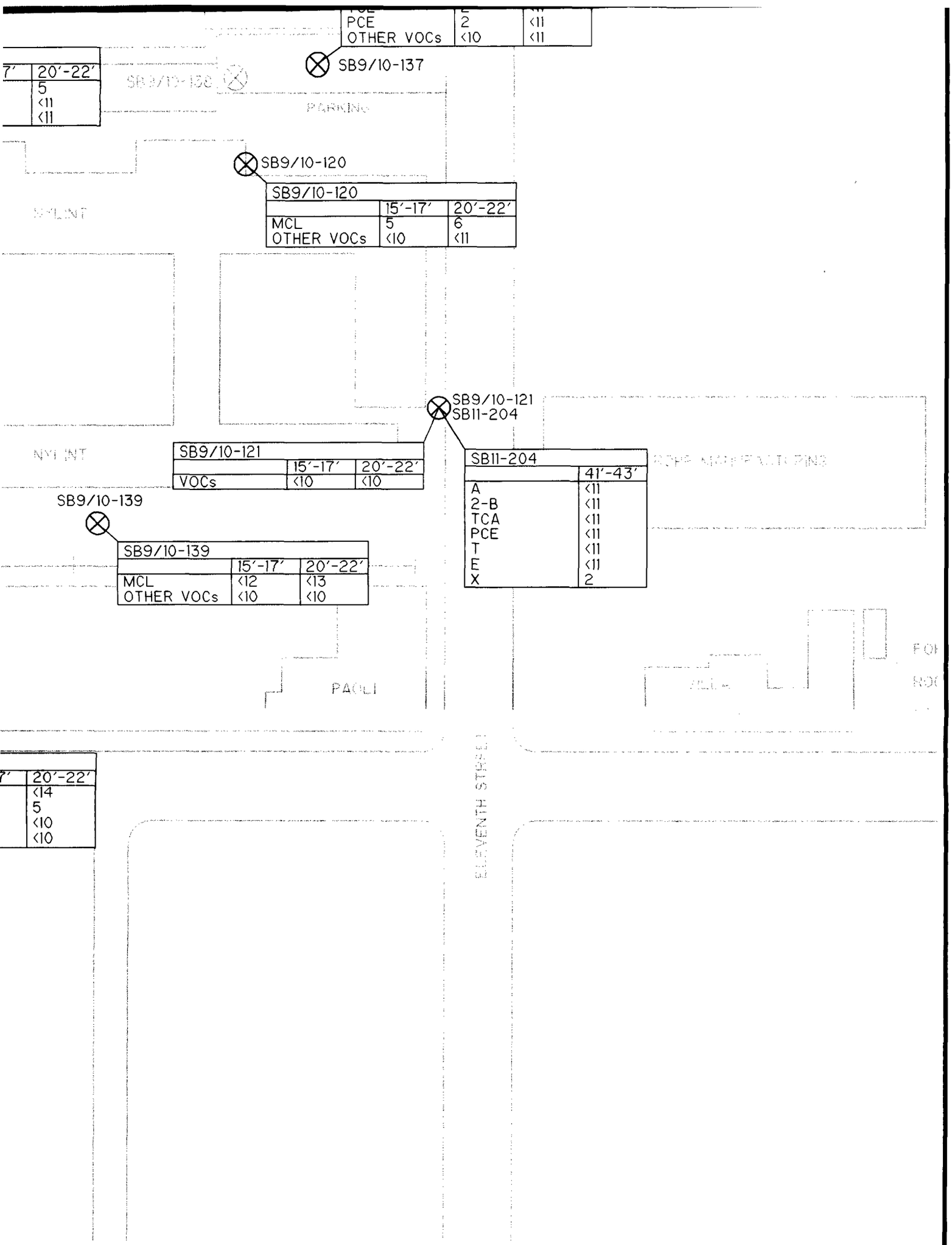
Project Location: ROCKFORD, ILLINOIS

Project Number: 1681-11110-014.RI

Sample Type	Sample Number	Organic Vapor (ppm)	Blows per 6 Inches	Recov./ Adv.	Material Description	Graphic Log	Elev. Depth (ft.)
							699.0 30
							694.0 35
SS	SB203-001	NA	2;4; 5;6;	20"/24'	39'-43': Brown, fine to coarse SAND;		689.0 40
SS	SB203-002	NA	3;5; 5;7;	12"/24"			
SS	SB203-003	NA	4;4; 5;9;	18"/24"	43'-49': Brown, fine to coarse SAND, w/trace gravel;		684.0 45
SS	SB203-004	NA	4;5; 5;7;	18"/24"			
SS	SB203-005	NA	4;5; 7;7;	17"/24"			
SS	SB203-006	NA	5;7; 10;16;	18"/24"	49'-51': Brown, fine to coarse SAND w/gravel;		679.0 50
							674.0 55
							669.0 60



Well Construction Detail



SOUTHEAST ROCKFORD
SOURCE CONTROL OPERABLE UNIT

AREA 9/10 SUBSURFACE SOIL DATA FOR ALL SAMPLE LOCATIONS

Figure No. E-1

Appendix F

APPENDIX F
RAW SURVEYING DATA
JULY 2000

e: CDMWELLS.CRS

	NORTHING	EASTING	ELEVATION	NOTE
120	2032213.0633	2592985.3847	729.6179	MW-202
121	2032213.0067	2592984.9272	729.8400	CS MW-202
122	2032212.9500	2592984.4695	729.5427	GN MW-202
123	2032044.8930	2592549.3785	729.0204	MW-2
124	2032045.1195	2592549.3925	729.4700	CS MW-2
125	2032045.3457	2592549.4065	729.4247	BI MW-2
126	2032049.1022	2592727.0990	729.3997	MW-5
127	2032048.6959	2592727.1707	729.3397	CS MW-5
128	2032048.2898	2592727.2423	729.6311	BI MW-5
129	2032079.0363	2592993.4002	729.0932	MW-203
130	2032078.8249	2592993.6946	729.6532	CS MW-203
131	2032078.6132	2592993.9893	729.5944	CN MW-203
132	2032101.5632	2592493.6417	728.1035	MW-4
133	2032101.4477	2592493.2042	728.5635	CS MW-4
134	2032101.3323	2592492.7668	728.4903	BI MW-4
135	2031653.6876	2591771.5668	729.0337	MW-201
136	2031653.6062	2591771.0260	729.2637	CS MW-201
137	2031653.5235	2591770.4806	729.2620	GV MW-201

Corrected values

Appendix G

APPENDIX G
INITIAL ECOLOGICAL RISK REPORT
JULY 2000

Ecological Risk Assessment
Area 7 - Southeast Rockford Source Control Operable Unit

1.0 Introduction

Ecological Risk Assessments (ERAs) evaluate the likelihood that adverse ecological effects may occur or are occurring at a site as a result of exposure to single or multiple chemical stressors. Risks result from contact between ecological receptors and stressors that are of sufficiently long duration and of sufficient intensity to elicit adverse effects. The primary purpose of this screening-level ERA is to identify contaminants in surface water and sediment that can result in adverse effects to present or future ecological receptors.

This ERA is based primarily on a screening-level approach in which measured chemical concentrations in surface water and sediment are compared to relevant effects concentrations. This ERA is intended to provide information that can help establish remedial priorities and serve as a scientific basis for regulatory and remedial actions for the site.

The general approach used to conduct this ERA is based on site-specific information and on recent EPA guidance, primarily *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 1997a), supplemented by *Guidance for Ecological Risk Assessment* (EPA 1998). The EPA (1998, 1997a) and others (e.g., Barnthouse et al. 1986) recognize that methods for conducting ERAs must be site-specific, and guidance for conducting ERAs are therefore not intended to serve as detailed, specific guidance documents. As much as practicable, the methods, recommendations, and terminology of the Superfund guidance (EPA 1997a) are used to conduct this ERA. The organization of this ERA follows the format presented in the 1997 Superfund guidance document, with some modifications made for site-specific considerations and readability. The primary components of this ERA are Problem Formulation, Analysis Phase, and Risk Characterization. Each of these components is presented below.

2.0 Problem Formulation

The Problem Formulation phase of this ERA establishes the goals and describes the scope and focus of the assessment. The problem formulation phase of the ERA can often be summarized by stating testable null hypotheses. Null hypotheses are generally presented as statements that are rejected or accepted based on relevant data and best professional judgment. The hypotheses to be answered in the ERA are presented below.

- *Chemical contaminants are not present in surface water and sediment onsite or adjacent to the site.*

This question is addressed in the Exposure Assessment phase of the ERA.

- *Where present, the concentrations of chemical contaminants are not sufficiently elevated to impair the survival, growth, or reproduction of sensitive ecological receptors.*

This question is addressed in the Effects Assessment phase of the ERA.

- *Known or potential ecological receptors are not sufficiently exposed to chemical contaminants to cause adverse population-level or community-level effects.*

This question is addressed in the Risk Characterization phase of the ERA, where numeric risk estimates are evaluated with respect to ecological significance.

The problem formulation phase of the ERA also considers site-specific regulatory and policy issues and requirements and preliminarily identifies potential stressors and receptors. Important products of the Problem Formulation phase of the ERA are descriptions of potential sources of ecological stress, potential receptors, exposure pathways and the relationship between general remedial action objectives, assessment endpoints, and measurement endpoints. These are discussed in the following sections.

2.1 Contaminants of Potential Concern

This ERA is focused on the potential ecological effects associated with chemical contamination of surface water and sediment. Contaminated groundwater is addressed in the evaluation of surface water. This approach is based on the rationale that groundwater that discharges into surface water is assessed indirectly through the assessment of surface water quality. Surface soils are not evaluated in this screening-level ERA, which is focused on aquatic environments.

Preliminary data screening suggests that the current levels of some chemical constituents in surface water and sediments have potential to adversely affect ecological receptors. This ERA determines whether such effects are likely to be occurring now or in the future. In addition, this ERA assesses the magnitude of actual or predicted effects based on the nature and extent of chemical contamination.

Based on recently collected creek water and sediment data for this site, the chemicals of potential concern (COPCs) for this ERA include pesticides, PCBs, polycyclic aromatic hydrocarbons (PAHs), phthalates, and a limited number of volatile and other (i.e., non-PAH) semi-volatile organic chemicals. Following EPA guidance, chemicals detected in surface (creek) water and creek sediments at greater than five percent frequency of detection are included in the initial screening of COPCs.

Fifteen COPCs are initially identified for creek water, including six volatile organics, three semi-volatile organics, and six pesticides. Nineteen COPCs are identified for creek sediments, including one volatile organic, nine PAHs, eight pesticides, and one PCB (Aroclor 1254). Some of these 19 sediment COPCs are also COPCs for surface water. In total, 29 chemicals are initially identified as COPCs for this ERA, and these are presented in Table 1.

These 29 COPCs are not equal in their potential to cause adverse ecological effects. Some of the chemicals initially identified as COPCs are known to be toxic under certain conditions, while others are initially retained as COPCs simply because the limited number of samples (five maximum) precludes the elimination of any chemical detected. The latter is based on the accepted practice of eliminating chemicals with a frequency of detection less than five percent. With only five samples, even a single detection equates to a frequency of detection of 20

percent. It is therefore expected that some of the initially identified COPCs contribute little or no risk to exposed receptors, while others have greater potential to cause adverse effects. A primary purpose of the ERA is to determine the major contributors to ecological risk at this site.

Table 1
Data Summary - Initial COPCs

Chemical	Frequency of Detection (percent)	Concentration Range (detected samples) ppb
Sediment (ug/kg)		
1,2-dichloropropane	40	2 - 13
4,4'-DDD	100	0.37 - 1.9
4,4'-DDE	80	0.22 - 0.4
Aldrin	20	0.37
Alpha chlordane	100	0.21 - 0.53
Aroclor 1254	80	23 - 56
Benzo(a)anthracene	100	38 - 230
Benzo(a)pyrene	17	54
Benzo(b)fluoranthene	100	94 - 510
Benzo(k)fluoranthene	100	99 - 540
Bis(2-ethylhexyl)phthalate	100	140 - 430
Chrysene	100	44 - 270
Delta BHC	100	0.29 - 1.2
Dieldrin	100	0.21 - 0.38
Endosulfan II	40	0.3 - 0.31
Fluoranthene	100	92 - 590
Methoxychlor	100	0.76 - 4.6
Phenanthrene	80	56 - 240
Pyrene	100	42 - 140
Surface Water (ug/L)		
1,1-dichloroethane	80	13 - 30
1,1-dichloroethene	20	1

Table 1 Data Summary - Initial COPCs		
Chemical	Frequency of Detection (percent)	Concentration Range (detected samples) ppb
1,2-dichloroethene (total)	80	31 - 54
1,1,1-trichloroethane	80	7 - 36
4-nitrophenol	20	2
Alpha BHC	20	0.0012
Chloroethane	20	10
Dieldrin	20	0.00086
Diethylphthalate	20	2
Endosulfan II	40	0.002 - 0.0037
Endrin ketone	60	0.0023 - 0.0024
Endrin aldehyde	40	0.0022 - 0.0026
Gamma BHC (Lindane)	20	0.001
Pyrene	20	2
Trichloroethene	40	1

The data summary table (Table 1) presents media-specific concentration ranges of detected chemicals and frequency of detection for the initial COPCs. The maximum detected values provide the most appropriate "reasonable maximum exposure" information on contaminant concentrations because of limited data quantity. The average concentration would probably better represents the concentration to which ecological receptors are most likely to encounter, but the true average exposure concentration is unlikely to be accurately derived from approximately five samples. This ERA therefor relies on the maximum detected contaminant concentration to estimate risks in the Risk Characterization section of the ERA.

2.2 Chemical Properties of COPCs

The chemical properties of the COPCs identified in Table 1 affect the fate and transport of COPCs in the environment. Table 2, presented below, presents important chemical properties for the major groups of COPCs identified at this site. Each of these properties are discussed below.

Environmental Persistence

Environmental persistence indicates whether a chemical is likely to be long-lasting in the environment or, alternatively, be degraded by natural processes. For example, some highly chlorinated pesticides are not easily degraded, and are considered to be very persistent. Other

less chlorinated compounds can be degraded by biological and other processes (e.g., photolysis) and therefore may not persist in the environment. Also, volatile organic compounds are unlikely to persist in sediments and surface water.

Bioconcentration Potential

Bioconcentration potential indicates whether a chemical is likely to be retained in biological tissues after it is ingested. Retention of chemicals is not in itself an appropriate measurement endpoint unless it is associated with adverse ecological effects. Retention is, however, useful for verifying exposure and for evaluating bioavailability and the potential for food chain/food web effects. Bioconcentration factors (BCFs), usually derived under equilibrium conditions in a laboratory, are often used as screening-level data to evaluate bioaccumulation potential. BCFs are based on the ratio of contaminant concentration in aquatic biota to contaminant concentration in water. Because BCFs are derived under equilibrium conditions and under relatively long exposure durations, they consider both uptake and elimination (depuration) rates. Chemicals with BCFs greater than 300 generally indicate a potential to bioconcentrate (EPA 1991). Chemicals with log BCFs above 3 (BCFs above 1,000) are considered to have significant potential to bioaccumulate (EPA 1992a). For this ERA, available freshwater BCFs for invertebrates and fish that are (1) known to occur on or near the site, (2) have potential to occur there, or (3) are related to local species are used to evaluate bioconcentration potential. Table 3 presents relevant BCFs for the initial COPCs.

Bioavailability

For this ERA, bioavailable chemicals are defined as those that exist in a form that have the ability to cause adverse ecological effects or bioaccumulate. As stated previously, bioaccumulation may not in itself constitute a significant ecological effect, but provides evidence of exposure and potential for causing adverse effects under certain conditions. For example, some lipophilic chemicals are taken up by biota and are stored in fatty tissues with no apparent ill effects. However, under conditions of reduced food quality and/or quantity, such as during winter when only poor quality foods may be available, these fats are metabolized and the contaminants can then cause adverse effects.

Chemical properties (e.g., ionic form) or environmental conditions (e.g., high levels of dissolved and particulate organic carbon) can affect the potential bioavailability and toxicity of many chemicals. The bioavailability and toxicity of such chemicals in surface water can be influenced, for example, by the concentration of dissolved organic carbon, calcium, and magnesium. In addition, sediment organic carbon content, measured as total organic carbon (TOC) apparently affects bioavailability and toxicity of certain chemicals. For some chemicals, chemical form and thus toxicity can change rather rapidly under changing environmental conditions (e.g., fluctuations in pH, temperature, or surface water flow). Seasonal conditions such as snowmelt and rainfall are likely to affect bioavailability of chemical contaminants in surface water. The bioavailability (and potential toxicity) of chemicals with a high affinity for lipids (lipophilic chemicals) or organic carbon is expected to remain fairly stable because these chemicals bind strongly to organic particulate matter. Once taken up, they are likely to be stored predominately in fatty tissues.

Table 2
General Chemical Properties for Initial COPCs by Chemical Class

Chemical or Class of Chemical	Bioaccumulation Potential	Bioavailability and Toxicity	Environmental Persistence
Polycyclic Aromatic Hydrocarbons (PAHs)	Variable, but most animals and microorganisms can metabolize PAHs to products that ultimately experience complete degradation (Eisler 1987). Rapid uptake and rapid metabolism and elimination is expected in most cases.	Toxicity increases with molecular weight (MW) most cases. Low solubility decreases bioavailability of high MW PAHs. Bioavailability in sediments is generally low. Some PAHs are carcinogenic to mammals.	Generally persistent. Primarily degraded by photolysis and microbial degradation. Degradation slow in sediments that are anoxic with little light penetration.
Chlorinated Pesticides/ Herbicides	Variable, but some (e.g., DDT) accumulate to a very high degree in biological tissues. Most are stored in fatty tissues of animals.	Most are highly toxic and readily bioavailable to aquatic and terrestrial biota.	Most chlorinated hydrocarbons are persistent in the environment because they are resistant to degradation. Organochlorines are generally short-lived in water but may persist in soils.
Volatile Organic Compounds (VOCs)	Low bioaccumulation potential.	Generally low toxicity. Some are common laboratory contaminants. Detections in surface media should be viewed with caution due to expected volatilization and generally rapid degradation.	Not persistent. Easily degraded.

Table 3 Freshwater BCFs for Initial COPCs				
Chemical	Log BCF	Source Species (freshwater)	Reference	Bioaccumulation Concern
1,2-dichloropropane	est. 1.3 from log Kow (2.16)	NA	EPA 1988a	NO
1,1-dichloroethane	est. 1.0 from log Kow (1.79)	NA	EPA 1988a	NO
1,1-dichloroethene	est. 0.8 from log Kow (1.48)	NA	EPA 1988a	NO
1,1,1-trichloroethane	est. 1.3 from log Kow (2.07)	NA	EPA 1988a	NO
4,4'-DDD	est. 4.4 from log Kow (6.10)	NA	EPA 1988a and Jones, Suter, Hall 1997	YES
4,4'-DDE	4.71	fathead minnow	EPA 1988a	YES
4-nitrophenol	est. 1.1 from log Kow (1.91)	NA	EPA 1988a	NO
Aldrin	4.28	multiple species	EPA 1980a	YES
Alpha chlordane	est. 4.58 from log Kow (6.00)	NA	EPA 1988a	YES
Alpha BHC	est. <3.0 from gamma BHC	NA	EPA 1988a	NO
Aroclor 1254	est. 4.60 from log Kow (6.47)	NA	EPA 1988a	YES
Benzo(a)anthracene	4.0	*Daphnia pulex*	Eisler 1987	YES
Benzo(a)pyrene	est. 4.7 from log Kow (6.40)	NA	EPA 1988a and 1980b	YES
Benzo(b)fluoranthene	est. 4.8 from log Kow (6.57)	NA	EPA 1988a and 1980a	YES
Benzo(k)fluoranthene	est. 5.1 from log Kow (6.84)	NA	EPA 1988a and 1980b	YES
Chloroethane	est. <1.4 from log Kow (1.43)	NA	EPA 1988a	NO
Chrysene	<3.0	multiple species	Eisler 1987	NO
Delta BHC	est. <3.0 from gamma BHC	NA	EPA 1988a	NO
Dieldrin	est. 3.9 from log Kow (5.37)	NA	EPA 1988a and Jones, Suter, Hall 1997	YES
Diethylphthalate	est. 0.7 from log Kow (1.40)	NA	EPA 1988a	NO
Endosulfan II	est. 2.8 from log Kow (4.10)	NA	EPA 1988a and Jones, Suter, Hall 1997	NO
Endrin ketone	3.28 (est. from endrin)	fathead minnow	EPA 1988a	YES

Table 3 Freshwater BCFs for Initial COPCs				
Chemical	Log BCF	Source Species (freshwater)	Reference	Bioaccumulation Concern
Endrin aldehyde	3.28 (est. from endrin)	fathead minnow	EPA 1988a	**YES**
Fluoranthene	<3.0	multiple species	Eisler 1987	NO
Gamma BHC (Lindane)	est. 2.67 from log Kow (3.85)	NA	EPA 1988a	NO
Methoxychlor	est. 3.92 from log Kow (4.30)	NA	EPA 1988a	**YES**
Phenanthrene	<3.0	multiple species	Eisler 1987	NO
Pyrene	3.43	*Daphnia pulex*	Eisler 1987	**YES**
Trichloroethene	est. 1.23 from log Kow (2.42)	NA	EPA 1988a	No

Significant bioconcentration potential based on log BCF >3.0 (BCF >1,000)

As presented in Table 3, 14 of the 29 initially identified COPCs have significant potential to accumulate in biological tissues. These 14 COPCs are therefore retained for evaluation of the potential to cause adverse food chain/food web effects.

2.3 Potential Receptors

Potential ecological receptors for this study are defined as plants and animals (i.e., macroinvertebrates, fish, amphibians, reptiles, birds, and mammals) that inhabit or use, or have potential to inhabit or use the aquatic, riparian, and terrestrial habitats of the site. Other organisms (e.g., bacteria, protozoans, and fungi) are also recognized as essential components of aquatic and terrestrial ecosystems, but potential impacts to these organisms are not generally assessed in ERAs because adequate ecotoxicological data are unavailable.

For ERA purposes, the study area consists of Area 7 and areas immediately adjacent. Studies were not conducted specifically to evaluate the relative abundance or diversity of plant and animal species resident to or using the site. In general, however, observations of plants and animals onsite are used to support the ERA by evaluating or confirming habitat suitability.

EPA guidance and common ERA practice precludes the need to assess potential risks for each and every species identified onsite. Several species or groups of organisms are therefore selected to serve as representative receptors for a more detailed evaluation of potential risks. The selection of these representative receptors is based on (1) their perceived importance to local ecosystems (e.g., key prey species, abundant organisms), (2) their relationship with media of concern (i.e., sediment and surface water), and (3) the availability of relevant data for

assessing potential risk. Using these criteria, the following groups of organisms serve as ecological receptor groups for the ERA.

- Aquatic Macroinvertebrates
  (e.g., larval midges, mayflies, stoneflies, caddisflies; amphipods; snails; important prey species for many fish; generally abundant; potential for high biomass; sensitive to water quality impairment; large toxicity database)

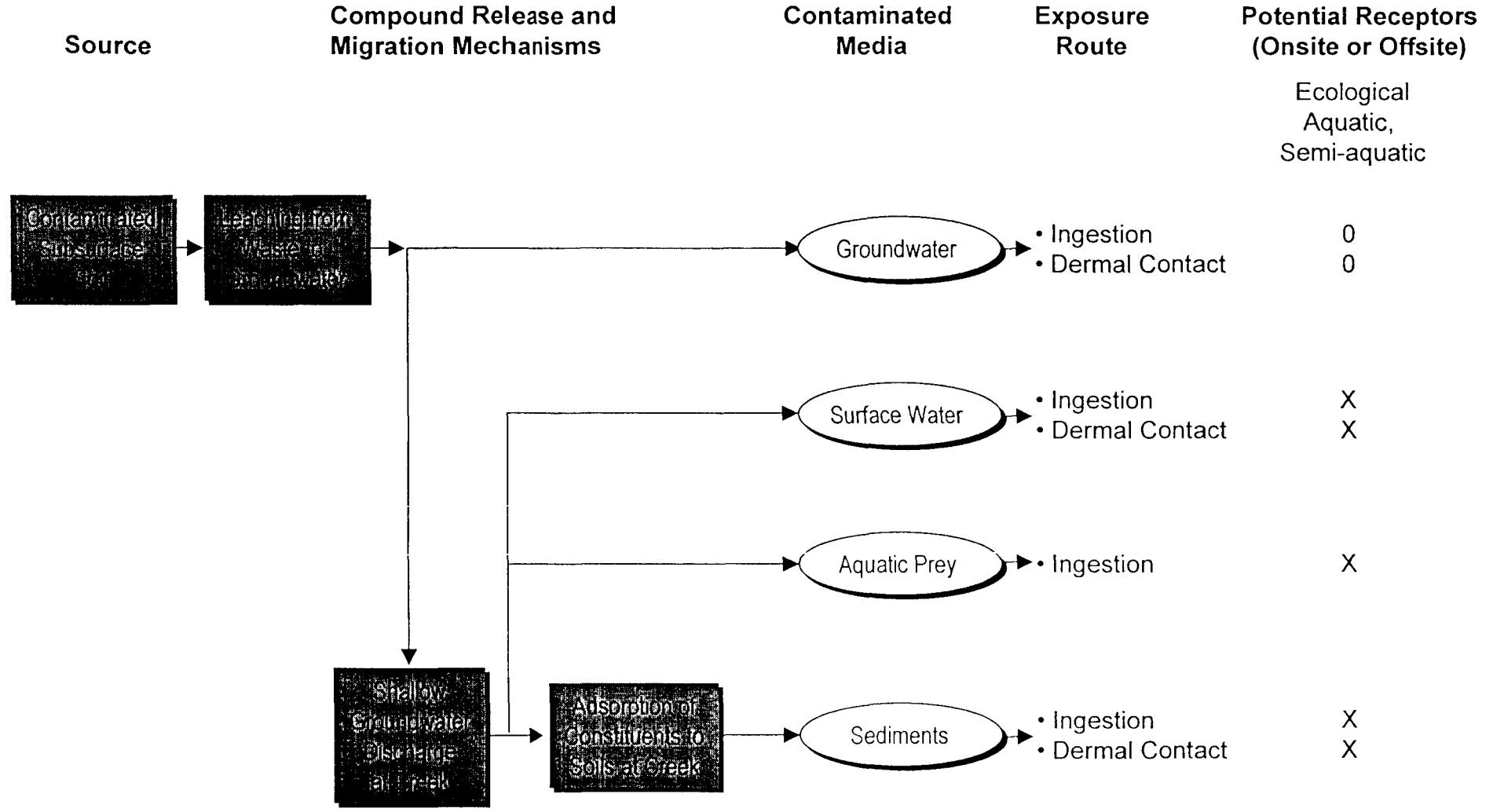
- Freshwater Fish
  (e.g., forage and predator species; potential for high biomass; sensitive to water quality impairment; large toxicity database)

- Piscivorous Birds
  (e.g., belted kingfisher; abundant; protected; preferentially consumes fish that may bioaccumulate contaminants in aquatic environments)

- Top Predators
  (e.g., red fox; at greatest risk for contaminants that bioaccumulate and biomagnify; substantial toxicity data available for closely related dogs)

2.4 Exposure Pathways

Exposure pathways indicate how ecological resources can co-occur or come in contact with hazardous chemicals or materials such as contaminated water and sediments. Descriptions of exposure pathways for ecological receptors are presented in the overall site conceptual exposure model (**Figure 1**). Included in this figure are contaminant sources, fate and transport processes, and exposure routes. Some of the ecological pathways shown in Figure 1 are considered to be relatively minor, and not fully evaluated in this ERA. This ERA is focused on the risks associated with the ingestion of and direct contact with COPCs that migrated into creek sediments and surface water via groundwater inflow or overland flow.



LEGEND

——— Potential Pathway
X Primary Exposure Pathway
O Minor or Unlikely Exposure Pathway

FIGURE 1
SITE CONCEPTUAL EXPOSURE MODEL
AREA 7 CREEK
SOUTHEAST ROCKFORD SCOU

CDM Camp Dresser & McKee

2.5 Assessment and Measurement Endpoints

This section introduces, defines, and discusses appropriate assessment and measurement endpoints for evaluating potential ecological effects.

2.5.1 Assessment Endpoints

Assessment endpoints identify the ecological values to be protected (e.g., abundance and diversity of aquatic macroinvertebrates or fish). Assessment endpoints are directly related to ERA-related remedial action goals and objectives determined for this site. Appropriate assessment endpoints are developed by risk assessors and often consider guidance from relevant regulatory agencies. ERA-related remedial action goals and objectives for this site have not been determined, but are likely to include, for example, the maintenance of a reasonably (given the current constraints) healthy and diverse aquatic ecosystem in the creek adjacent to Area 7. Reasonable site-specific remedial action goals and objectives are assumed and preliminarily used to define appropriate assessment endpoints for this ERA.

Assessment endpoints generally consider ecological relevance, regulatory concerns, societal values, and susceptibility to identified site-specific stressors. For this site, an example of an appropriate assessment endpoints is the abundance and diversity of benthic macroinvertebrates in the creek adjacent to the site. This assessment endpoints is directly or indirectly related to the remedial action goals and objectives assumed for this site. Risk managers may choose to modify remedial action goals and objectives at some time because of concerns (e.g., technological or financial) outside the domain of risk assessment. Assessment endpoints for this ERA are included in Table 4.

2.5.2 Measurement Endpoints

Assessment endpoints are often difficult to measure or evaluate directly. For example, we cannot predict with certainty the critical concentration of a toxicant in surface water and sediment that allows survival and successful reproduction of ecologically important benthic invertebrates in the creek near the site. Such critical concentrations are site-specific and depend on many factors, including the requirements and sensitivities of prey species, chemical interactions (i.e., synergistic, antagonistic, or additive), and the physical and chemical characteristics of the creek (e.g., streambed particle size, sediment organic carbon content, dissolved organic carbon concentration in surface water, temperature, dissolved oxygen, streambank and instream cover, etc.).

Measurement endpoints are used in cases where assessment endpoints cannot be directly measured or evaluated. Measurement endpoints are quantitative expressions of observed or measured biological responses to stressors relevant to selected assessment endpoints. For example, an abundant and diverse macroinvertebrate population (an assessment endpoint) can be evaluated using aquatic toxicity data (measurement endpoints) derived from appropriate laboratory tests. As a specific example, concentrations of dieldrin in creek water can be

compared to dieldrin concentrations laboratory test water that resulted in observed ecologically significant effects to sensitive and relevant test species. For this ERA, ecologically significant effects are defined as those affecting survival, growth, or reproduction. The example described above expresses the relationship between a relevant measurement endpoint (chronic effects concentration of dieldrin in surface water) that is directly related to the assessment endpoints of fish or invertebrate abundance and reproduction. Measurement endpoints selected for this ERA, presented in Table 4, are based on information from appropriate aquatic ecology or toxicology studies or databases (e.g., data summarized in EPA water quality criteria documents).

Table 4
ERA-Related Goals and Objectives - Major Assessment and Measurement Endpoints

Potential Era-related Remedial Action Objectives	Major Assessment Endpoints	Examples of Data Types That May Be Used As Measurement Endpoints
Maintain surface water quality related to COPCs to meet water quality criteria or appropriate risk-based levels	Macroinvertebrate and fish abundance and diversity	Toxicity of COPCs in *surface water* to aquatic macroinvertebrates and fish - based on media-specific, chemical-specific, and receptor-specific toxicity data; comparisons to criteria, standards, and recommended threshold concentrations for surface water
Prevent exposure of aquatic species to instream sediments having chemical contaminant concentrations in excess of risk-based or other relevant levels	Macroinvertebrate and fish abundance and diversity	Toxicity of COPCs in *sediments* to benthic aquatic macroinvertebrates and fish - based on media-specific, chemical-specific, and receptor-specific toxicity data; comparisons to recommended threshold concentrations for aquatic sediments
Prevent exposure of consumers of aquatic and semi-aquatic to prey species having chemical contaminant concentrations in excess of risk-based or other relevant levels	Abundance and diversity of upper trophic level predators	Bioaccumulation potential of COPCs in *sediments and water* to potential prey species - based on comparisons of dose calculations to recommended thresholds to prevent sublethal effects in predator species

3.0 Analysis Phase

This phase of the ERA analyzes exposure data (Exposure Assessment) and effects data (Effects Assessment) for the major chemical stressors and representative receptors previously identified in Problem Formulation.

3.1 Ecological Exposure Assessment

Exposure Assessment summarizes and evaluates available exposure data, including exposure-related data on potential ecological receptors or receptor groups. The primary output of

exposure assessment is an exposure profile that presents the magnitude (e.g., concentration) and distribution (e.g., in surface water and sediment) of stressors to which ecological receptors may be exposed. For this ERA, the primary stressors associated with one or more types of media include volatile organics, phthalates, PAHs, pesticides, and PCBs. Exposure profiles for these stressors serve as input into the final stage of risk assessment, Risk Characterization.

3.1.1 Exposure Profiles

Exposure Profiles describe the magnitude and distribution of stressors identified in the Problem Formulation phase. Exposure concentration data are presented in Table 1, while general exposure information is presented in Tables 5 for the chemical stressors on which this ERA is focused.

Exposure Profiles - Chemical Stressors

Table 1 includes media-specific concentrations for the initial COPCs. Recently collected data considered useable for risk assessment purposes are used to describe the magnitude and distribution of chemical contaminants in the site environment. Although no single concentration value can truly represent the variability of chemical concentrations measured in each media of concern, the upper 95th confidence limit of the arithmetic mean value (U95) probably best represents a reasonable maximum concentration to which receptors may be exposed. Where sufficient data have been collected, the U95 is often used to represent the true mean value. Support for using U95 values is found in recent EPA guidance (1992b) for calculating values that are most representative of actual chemical concentrations in environmental media to which human or ecological receptors may be exposed. This guidance states, however, that calculation of U95 values are appropriate only when sufficient data (i.e., at least 20 to 30 samples) are available. In this particular case, insufficient data have been collected from each individual sampling location to allow appropriate use of U95 calculations--U95 values commonly exceed maximum values where data are limited.

Where chemical concentration data are limited, it is common and accepted practice to use either the arithmetic mean or the maximum detected concentration to represent exposure point concentrations. This ERA uses maximum detected concentration to screen COPCs and to evaluate risks. Although the use of maximums for risk estimation appears conservative, this approach is unlikely to greatly overestimate reasonable maximum exposures because the maximum detected value is based on only a few samples that may not represent the actual range of concentrations to which receptors may be exposed.

Table 5
General Exposure Data for Representative Ecological Receptor Groups

REPRESENTATIVE RECEPTOR GROUP	PRIMARY STRESSOR	PRIMARY POTENTIAL EXPOSURE ROUTES / PROCESSES
Aquatic Macroinvertebrates (e.g., mayfly and midge	Contaminated SW and SED	SW contact and ingestion Ingestion of contaminated prey

Table 5
General Exposure Data for Representative Ecological Receptor Groups

REPRESENTATIVE RECEPTOR GROUP	PRIMARY STRESSOR	PRIMARY POTENTIAL EXPOSURE ROUTES / PROCESSES
larvae)		SED/pore water contact and ingestion
Freshwater Fish	Contaminated SW and SED	SW contact and ingestion, Ingestion of contaminated prey SED/pore water contact and ingestion
Piscivorous Birds (e.g., belted kingfisher)	Contaminated Prey (primarily fish)	Ingestion of contaminated prey (primarily fish)
Top Predators (e.g., red fox)	Contaminated Invertebrate/ Vertebrate Prey	Ingestion of contaminated aquatic, semi-aquatic, and terrestrial prey

SW = Surface Water
SED = Sediment

Exposure Profiles - Potential Ecological Receptors

Exposure-related information for each of the representative groups of organisms previously identified as potential receptors for this ERA are described in this section. These descriptions are based on likely exposure scenarios preliminarily identified in the Problem Formulation phase of the ERA. These preliminary exposure scenarios are refined here for the major representative receptor groups previously identified. The receptor groups represent species or other taxa with reasonable potential to be exposed to site-related stressors. Exposure scenarios are simplified descriptions of how potential receptors or representative receptor groups may come in contact with previously identified stressors.

Major exposure pathways for many organisms include direct contact with and ingestion of contaminated media and/or prey. Consumption of contaminated prey is generally estimated using daily intake rates for representative animals. Such rates are most appropriately calculated using site-specific data (e.g., contaminant concentrations in food items and dietary composition). Site-specific input parameters for deriving daily intake rates for terrestrial animals are, however, unavailable for this ERA. Critical dietary threshold values for terrestrial wildlife species are therefore used to evaluate dietary exposures in this ERA, and these values are based on appropriate literature values, such as those presented in EPA's Wildlife Exposure Factors Handbook (1993) and in EPA toxicity databases. Exposure scenarios for representative aquatic and semi-aquatic animals, piscivorous birds, and upper trophic level terrestrial predators are discussed below.

3.1.2 Exposure Scenarios

Although several potential exposure scenarios can be identified for ecological receptors, it is most appropriate to focus the assessment on critical exposure scenarios or those most likely to contribute to risk. This ERA is focused on the most critical exposure scenarios identified in the site conceptual model. For example, the air pathway (i.e., inhalation of potentially contaminated

air) is rarely considered significant for ecological receptors, and ecotoxicity data based on inhalation are unavailable. This pathway is therefore not usually assessed in an ERA. Critical exposure scenarios identified for this ERA are discussed below.

Aquatic Exposures

The primary site-related risks for aquatic organisms are likely to be from direct contact with and ingestion of contaminated surface water if and where surface water COPC concentrations are elevated. In addition, ingestion of sediment and sediment pore (interstitial) water with elevated COPCs poses risks to benthic and to a lesser extent water-column biota where such media are contaminated. In addition, aquatic organisms that occupy upper trophic levels (e.g., predatory fish) can be adversely affected by ingesting prey that have accumulated contaminants. This is of most concern for chemicals that readily bioaccumulate, such as 4,4'-DDD, 4,4'-DDE, Aroclor 1254, etc. The relative contribution from each exposure media type (surface water, sediment, interstitial water, and prey) to overall aquatic exposure cannot, however, be reliably determined for most aquatic organisms because data describing the variability in factors that can affect total exposure are lacking. These factors can include intraspecific and interspecific differences in life stage, season, diet, ingestion rate, specific habitat, etc.
This assessment evaluates risks to aquatic biota by comparing recently measured COPC concentrations in surface water and sediments to media-specific criteria, such as chronic ambient water quality criteria (AWQC) and No Observed Adverse Effects Concentrations (NOAECs) derived experimentally or estimated from other critical effects concentrations (e.g., Lowest Observed Adverse Effects Concentrations or LOAECs) for appropriate species. Effects data are discussed in a following section.

Terrestrial Exposures

This ERA is focused on chemical contaminants in surface water, sediments, and potentially on aquatic and semi-aquatic biota that may have accumulated COPCs. Terrestrial exposures of concern are therefore limited to those associated with food chains/food webs that include aquatic and semi-aquatic biota. Terrestrial consumers of aquatic and semi-aquatic biota (e.g., piscivorous birds, omnivorous predatory mammals) therefore serve as the primary focus with regard to terrestrial exposures at this site. Such exposures are discussed below.

Exposures Via Food Chain Transfer

Certain chemicals that readily bioaccumulate differ in the likelihood and severity of adverse effects and in exposure duration based on environmental persistence. Some of the COPCs detected onsite are known to bioaccumulate following ingestion of contaminated surface water, sediment, or prey. Bioconcentration factors (BCFs) or bioaccumulation factors (BAFs) are often used to evaluate bioaccumulation potential. As stated previously, chemicals with BCFs less 300 are considered to have low bioaccumulation potential, while those with BCF between 300 and 1,000 have moderate potential to bioaccumulate. Chemicals with BCFs greater than 1,000 are of most concern with regard to potential bioaccumulation. Table 3 lists freshwater BCFs for the primary COPCs detected onsite that are expected to bioaccumulate.

Fourteen COPCs are identified as having significant potential to bioaccumulate, based on (1) the screening level assessment of experimentally derived bioconcentration factors (BCFs) greater than 1,000 (log BCF >3.0) or (2) estimated bioaccumulation potential based on log octanol/water partition coefficient (Kow). The latter estimated BCFs are based on structure activity relationships derived by Veith and Kosian (1982), presented in EPA 1988a. The COPCs with the reasonable potential to bioaccumulate include the following:

4,4'-DDD	Benzo(a)pyrene	Methoxychlor
4,4'-DDE	Benzo(b)fluoranthene	Pyrene
Aldrin	Benzo(k)fluoranthene	
Alpha chlordane	Dieldrin	
Aroclor 1254		
	Endrin ketone	
Benzo(a)anthracene	Endrin aldehyde	

Some of these chemicals are known to biomagnify (i.e., accumulate to increasingly higher concentrations in upper trophic level receptors). Organisms at the top of food webs/food chains are at most risk from chemicals that biomagnify, such as 4,4'-DDE and 4,4-DDD. Biomagnification of endrin ketone/aldehyde is not as well documented. The BCFs for these chemicals suggest, however, that bioaccumulation is likely. Limited data on methoxychlor suggests that this chlorinated pesticide is less likely to bioaccumulate than other chlorinated pesticides (EPA 1986).

Several high molecular weight PAHs are initially included in the list of COPCs with reasonable potential to bioaccumulate. However, many vertebrates possess enzymes that metabolize PAHs, and bioaccumulation is therefore lower in these organisms than predicted by Kow. Some invertebrates can also metabolize PAHs, while others cannot (Eisler 1987). Compared to PCBs and certain pesticides, PAHs are considered to have relatively lower potential for bioaccumulation because of rapid metabolism by many ecological receptors.

Risks to upper trophic level organisms are therefore expected to be greatest from the COPCs with the greatest potential to bioaccumulate and potentially biomagnify (4,4-DDD, 4,4-DDE, aldrin, alpha chlordane, Aroclor 1254, dieldrin, endrin ketone, and endrin aldehyde). These eight COPCs are evaluated in later sections for food chain/food web effects from bioaccumulation.

3.1.3 Exposure Analysis

Information on distributions of stressors and relevant receptors are combined and summarized in this section, and potential for exposure is discussed. For identified receptors or representative groups of receptors, estimates of potential exposure consider the important ecological parameters that can potentiate or modify exposure, such as habitat use and foraging behavior. Exposure-related information for representative receptors are summarized below.

TOP PREDATORS

Red Fox (*Vulpes vulpes*)

Red fox prefer habitats that provide both adequate cover and prey. The most suitable habitats for red fox are fallow fields, cultivated fields, meadows, bushy fence lines, woody streams, and low shrub cover adjacent to woodlands or water bodies (Baker 1983). Many of these habitats are available on or near the site. Red fox construct burrows which are used as refuges and for rearing young. The burrows are usually located in a well-drained area, however, red fox may sometimes construct dens on river islands (Arnold 1956). These burrows may extend ten to 30 feet below the ground surface (Baker 1983). Red fox are highly mobile, and forage extensively when food is limited. The home range is dependent on topography, vegetation, and prey availability (Baker 1983). Typically, a home range area will be comprised of an adult pair, their offspring, and occasionally a stray adult. The home range of red fox varies seasonally and by gender. For adult males the annual average home range is about 700 hectares, while females average only 96 hectares (EPA 1993). Red fox are nocturnal, and are active eight to 10 hours per 24 hour day. Eighty percent of this time is spent traveling. Red fox are also capable of swimming, which allow utilization of streams and rivers for food sources. In addition, red fox are burrowing animals and therefore spend much of their time digging. Whether red fox can detect and thus avoid chemical contaminants in surface soils or sediments is unknown. Red fox are omnivores, but about 90 percent of the diet is of animal origin. The year-around average diet of red fox in Missouri comprises about five percent plants, five percent invertebrates, 50 percent mammals, 25 percent birds, and 15 percent mixed carrion and other unspecified prey (EPA 1993).

PISCIVOROUS BIRD

Belted Kingfisher (*Ceryle alcyon*)

The belted kingfisher is medium-sized bird that eats primarily fish. Kingfishers typically are found along rivers and streams where streamside vegetation is fairly open, allowing an unobstructed view of the water. Kingfishers prefer to forage in clear waters and avoid those that are turbid, feeding primarily on fish that swim near the surface in shallow water (EPA 1993). This species breeds over most of North America, and winters in most regions of the continental U.S. (EPA 1993). During the coldest months, northern kingfishers migrate to southern regions.

Foraging territory varies with season and food availability. In general, foraging territories range from about one to two kilometers, shoreline length. From two to six pairs of kingfishers per 10 km of river shoreline have been recorded (EPA 1993).

AQUATIC PLANTS, MACROINVERTEBRATES, FISH

Most aquatic biota are continuously exposed to chemicals dissolved in surface water. They may be additionally exposed to chemicals dissolved in sediment interstitial or pore water and to chemicals bound to sediment particles. Fish are most at risk via ingestion of dissolved chemicals and to a lesser extent from ingestion of contaminated sediment (incidental) and prey. Prey ingestion is most critical for chemicals that bioconcentrate to a great degree, such as 4,4'-DDD and Aroclor 1254. Aquatic invertebrates can be similarly exposed, and some filter-feeders such as freshwater clams and mussels are known to bioaccumulate some chemicals very rapidly and to high concentrations. PAHs can concentrate to a high degree in some filter feeding organisms because many do not possess the enzymes that enable them to detoxify

and metabolize PAHs. In contrast, many fish and other vertebrates can detoxify and metabolize PAHs to varying degrees. Aquatic macrophytes can take up dissolved chemicals via root systems, and some single-celled algae can bind chemicals onto the cell surface without taking the chemical into the cell.

3.1.4 Uncertainty Evaluation - Exposure Assessment

All exposure assessments have a degree of uncertainty due to necessary simplifications and assumptions which must be made as part of the evaluation. Major sources of uncertainty in the exposure assessment include the values used to represent the magnitude and distribution of media-specific contamination. Obviously, all media cannot be sampled at all locations, and data interpolation and/or extrapolation is necessary. It is believed, however, that sufficient samples have been collected and appropriately analyzed to adequately describe the nature and extent of chemical contamination at this site. The use of maximum detected COPC concentrations because of the relatively small number of samples collected minimize the chance that exposure concentrations are underestimated in this ERA. On the other hand, exposure concentrations are unlikely to be significantly over-estimated because the maximum detected concentration, based on a few samples, is unlikely to represent the actual maximum exposure concentration to which ecological receptors may be exposed.

3.2 Ecological Effects Assessment

Effects Assessment includes an evaluation of data sources and data types, and presents media-specific and stressor-specific ecological effects concentrations for the COPCs identified for this site. These data serve as major components of stressor-response profiles, which describe the relationship between ecological stressors and effects.

3.2.1 Evaluation of Effects Data

This section of the ERA describes and provides support for the sources and types of effects data (e.g., toxicity data) selected for use in the ERA. Data sources and types are described on a media-specific basis. Selected measurement endpoints or effects data are based on relevance to the COPCs and receptors identified for this site. These data are directly applicable to the previously identified assessment endpoints and to likely remedial action objectives for this site. Some effects data are more relevant and useful than others. For example, effects data are unavailable for certain COPCs or types of receptors associated with this site. In these cases, the effects assessment is based on more general effects data available in the literature. The use of non-specific or surrogate effects data increases the uncertainties in risk estimates based on these data. Finally, site-specific bioaccumulation and toxicity data are unavailable for this ERA. The effects assessment uses a weight-of-evidence approach where multiple data sources are used to evaluate the most appropriate effects concentrations for estimating risk. Effects concentrations that are substantially lower or higher than the majority of the available data are not used because of the uncertainties associated with such data. This weight-of-evidence approach is especially important where relevant site-specific data are lacking. The availability of relevant and useful effects data is media specific, and effects data sources for each media of concern are presented below.

EFFECTS DATA SOURCES

Surface Water

Acceptable and relevant effects data for many site-related COPCs detected in surface water are available. The sources of such data are listed below. Most of the surface water toxicity data used in this ERA are from Quality Criteria for Water (EPA 1986) and chemical-specific Ambient Water Quality Criteria Documents developed by EPA. Also used are Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review (Eisler 1987), and Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (Suter and Tsao 1996).

Acute AWQC derived by EPA are used to assess potential for severe effects, based on mortality endpoints and short-duration toxicity tests. Chronic AWQC are used to evaluate potential for sublethal effects based on growth and reproduction endpoints and longer duration exposures. AWQC are intended to protect 95 percent of aquatic species 99 percent of the time. Therefore, maintaining exposure concentrations of contaminants below chronic AWQC should protect most species most of the time. Chronic AWQC are therefore the preferred type of effects data for surface water COPCs. Eisler (1987) summarizes available ecotoxicity data for several important PAH contaminants for both aquatic and terrestrial species. Finally, Suter and Tsao (1996) provide probably the most comprehensive summary of chemical-specific ecotoxicological data for aquatic receptors.

Table 6 identifies specific data sources and selected measurement endpoints or effects data from these sources, with adjustments as necessary to estimate safe concentrations or concentrations at which adverse effects are unlikely for most species. This concentration is commonly defined as the No Observed Adverse Effects Concentration or NOAEC. Where surface water effects values are based on the lowest observed adverse effect concentration or LOAEC for a particular species, these data are divided by 10 to estimate the NOAEC (LOAEC / 10 = NOAEC). This provides a level of safety for other non-tested species. Where effects values are based on sublethal effects to the most sensitive species within a multi-species database (e.g., AWQC or secondary chronic values), these data are not further adjusted or divided. In these cases, the criterion or secondary chronic value is considered a threshold that, if not exceeded, will protect most species most of the time. This is implied in the derivation of AWQC, and there is no reason to apply additional safety factors to AWQC or secondary chronic values if one assumes these values to be adequately protective of populations and communities. The final effects values based on NOAECs or appropriate surrogates protective of communities and populations (e.g., AWQC) are compared to exposure concentrations of COPCs detected in site surface water to estimate risks.

Effects Data Sources (Sediment)

Universally-accepted biological effects concentrations for most sediment contaminants have not been developed for ecological receptors. In general, the most useful data on potential sediment toxicity is obtained from site-specific studies using site sediments and resident or representative

species. Site-specific sediment toxicity data are, however, unavailable for this ERA. The evaluation of the potential toxicity associated with COPC contamination of onsite sediments is based on the comparison of COPC concentrations in site area sediments to relevant data from various sources. These sources include EPA sediment criteria, EPA-recommended or proposed sediment thresholds, and site-specific sediment concentrations based on the equilibrium partitioning (EP) approach recommended by EPA (Jones, Suter, and Hall 1997). The EP approach uses literature-based input parameters (e.g., sediment/water partition coefficients or Kps) and site-specific COPC concentrations in sediment. Other useful sediment effects concentrations are available from Long and Morgan (1991) and Persaud et al. (1993). Jones, Suter, and Hull (1997) presents a summary of relevant and useful ecotoxicity data for sediment contaminants, and they include data from EPA, Long and Morgan, Persaud et al., and others. This document provides the primary source of sediment toxicity data for this ERA.

Databases such as that of Long and Morgan (1991) have been established that describe the co-occurrence of chemical contaminants and apparent biological effects, and others (e.g., Persaud et al. 1993) include interim criteria for contaminants in sediment. Although the data presented in these more general databases are associated with certain limitations and uncertainties, they can contribute useful information to the overall evaluation of potential sediment toxicity using a weight-of-evidence approach. Such an approach is used in the selection of appropriate effects concentrations for COPCs in sediment.

Table 6 includes selected measurement endpoint data or effects data for creek sediments based on these data sources. Again, data based on single species LOAECs or similar values are adjusted to estimate safe or no effects concentrations based on estimated NOAECs. As for surface water effects values, sediment effects values based on sublethal effects in the most sensitive species within a multi-species database are not further adjusted. These data (e.g., low effect thresholds or values based on AWQC and EP) are considered protective of most species most of the time without further adjustment.

3.2.2 Stressor-Response Profiles

Chemical Stressors

Stressor-response profiles for chemical stressors (Table 6) present critical effects data for relevant ecological receptors or appropriate surrogate species that may be exposed to COPCs at this site. These profiles include information on the lethal and sublethal effects that may be exhibited by exposed organisms correlated to media-specific threshold concentrations of the COPCs.

There is not equal confidence in or universal acceptability of the effects concentrations presented in Table 6. Sources of ecological effects data were ranked for useability in the ERA. Data were taken from a second or third ranked source only if primary data sources were incomplete for a particular COPC. Sources or types of surface water effects concentrations used in Table 6 are listed below, in order of preference.

- EPA chronic national ambient water quality criterion (EPA)

(Assumes protection of 95% of aquatic species 99% of the time)

- Secondary chronic value derived by Suter and Tsao (1996)
  (Serves as surrogate for AWQC, and assumes similar level of protection)

- Estimated NOAEC based on LC_{50} estimated from chemical structure/activity relationships (SARs) presented in EPA 1988a.
  (LC_{50}/10 estimates LC_1 or effects threshold; effects threshold/10 estimates NOAEC)

Sources or types of sediment effects concentrations presented in Table 6 are listed below, in order of preference.

Organic COPCs in Sediment

- EPA chronic sediment criteria or proposed or recommended sediment threshold concentrations

- Sediment effects concentrations based on equilibrium partitioning (EqP) approach as recommended by EPA
  (these values are based on water quality benchmarks (e.g., EPA AWQC, secondary chronic values, or estimated NOAECs), log octonal/water partition coefficients (log Kow), and an assumed site total organic carbon (TOC) concentration of 1%)

- Low Effects Level (LEL) derived by the Ontario Ministry of the Environment for freshwater sediments (Persaud et al. 1993 in Jones, Suter, and Hall 1997)

- Threshold effects concentration derived by the Florida Department of Environmental Protection for marine and estuarine sediments (in Jones, Suter, and Hall 1997)
  (used for chrysene and pyrene only; assumes that toxicity in freshwater is not significantly different than that of saltwater or estuarine environments)

Table 6
Selected Effects Concentrations for COPCs in Surface Water and Sediment

Chemical	Exposure Media	Effects Concentration / Effects Description	Reference
1,2-dichloropropane	SED	**701 ug/kg** based on estimated aquatic LC50 (43,000 ug/L) / 100 to estimate NOAEC (430 ug/L) and EqP (log Kow=2.25, TOC=1%)	EPA 1988a and Jones, Suter, and Hall 1997
1,1-dichloroethane	SW	**47 ug/L** secondary chronic value	Suter and Tsao 1996
1,2-dichloroethene (total)	SW	**590 ug/L** secondary chronic value	Suter and Tsao 1996

Table 6
Selected Effects Concentrations for COPCs in Surface Water and Sediment

Chemical	Exposure Media	Effects Concentration / Effects Description	Reference
1,1-dichloroethene	SW	**25 ug/L** secondary chronic value	Suter and Tsao 1996
1,1,1-trichloroethane	SW	**11 ug/L** secondary chronic value	Suter and Tsao 1996
4,4'-DDD	SED	**110 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
4,4'-DDE	SED	**110 ug/kg** based on secondary chronic value for 4,4'-DDD	Jones, Suter, and Hall 1997
4-nitrophenol	SW	**300 ug/L** secondary chronic value	Suter and Tsao 1996
Aldrin	SED	**2 ug/kg** Ontario MOE LEL	Jones, Suter, and Hall 1997
Alpha BHC	SW	**2.2 ug/L** secondary chronic value	Suter and Tsao 1996
Alpha chlordane	SED	**2800 ug/kg** EPA chronic criterion	Jones, Suter, and Hall 1997
Aroclor 1254	SED	**810 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Benzo(a)anthracene	SED	**110 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Benzo(a)pyrene	SED	**140 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Benzo(b)fluoranthene	SED	**6200 ug/kg** based on secondary chronic sediment benchmark of 6200 ug/kg for fluoranthene	Jones, Suter, and Hall 1997
Benzo(k)fluoranthene	SED	**6200 ug/kg** based on secondary chronic sediment benchmark of 6200 ug/kg for fluoranthene	Jones, Suter, and Hall 1997
Bis(2-ethylhexyl)phthalate	SED	**890,000 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Chloroethane	SW	**1630 ug/L** estimated from M.W. (64.5), log Kow (1.43), based on 96-hr fish LC50 /100 to estimate NOAEC	EPA 1988a
Chrysene	SED	**108 ug/kg** based on threshold effects level from Florida Department of Environmental Protection	Jones, Suter, and Hall 1997
Delta BHC	SED	**120 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Dieldrin	SW SED	**0.062 ug/L** EPA chronic criterion **110 ug/kg** EPA proposed sediment quality criterion	Suter and Tsao 1996 Jones, Suter, and Hall 1997
Diethylphthalate	SW	**210 ug/L** secondary chronic value	Suter and Tsao 1996

Table 6
Selected Effects Concentrations for COPCs in Surface Water and Sediment

Chemical	Exposure Media	Effects Concentration / Effects Description	Reference
Endosulfan II	SW SED	**0.051 ug/L** secondary chronic value **5.5 ug/kg** secondary chronic value	Suter and Tsao 1996 Jones, Suter, and Hall 1997
Endrin ketone	SW	**0.061 ug/L** EPA chronic criterion for endrin	Suter and Tsao 1996
Endrin aldehyde	SW	**0.061 ug/L** EPA chronic criterion for endrin	Suter and Tsao 1996
Fluoranthene	SED	**6200 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Gamma BHC (Lindane)	SW	**0.08 ug/L** EPA chronic criterion	Suter and Tsao 1996
Methoxychlor	SED	**19 ug/kg** secondary chronic value	Jones, Suter, and Hall 1997
Phenanthrene	SED	**1800 ug/kg** EPA chronic criterion	Jones, Suter, and Hall 1997
Pyrene	SW SED	**3 ug/L** estimated from M.W. (202), log Kow (7.66), based on 14-d fish LC50 /100 to estimate NOAEC **153 ug/kg** based on threshold effects level from Florida Department of Environmental Protection	EPA 1988a and EPA 1980b Jones, Suter, and Hall 1997
Trichloroethene	SW	**47 ug/L** secondary chronic value	Suter and Tsao 1996

SW = Surface Water
SED = Sediment (all sediment effects concentrations assume 1% TOC)

3.2.3 Uncertainty Evaluation - Effects Assessment

In this section, the major sources of uncertainty in the effects analysis are identified and their potential impact on the ERA is evaluated. Media-specific toxicity data used in this ERA to describe the potential effects to ecological receptors are probably the primary source of uncertainty in the effects analysis. Extrapolations are often used to relate measurement endpoints (e.g., lethal concentrations or LC_{50} values) to assessment endpoints (e.g., macroinvertebrate abundance) or to relate one measurement endpoint (e.g., LC_{50}) to another (NOAEC). Extrapolations between taxa (e.g., species to species), between chemicals (e.g., based on similar structure), or between responses (e.g., lethal to sublethal) are commonly used where specific data are limited or lacking. The use of these types of extrapolation, however, increase uncertainty in risk assessment. The use of extrapolated data is therefore limited as much as possible in this ERA. In only a few cases are extrapolations between chemicals or responses made. In these cases, where toxicity data are lacking for a particular COPC, toxicity data from similar chemicals were reviewed and the most appropriate value was selected from

those available. Appropriateness was based on relative consistency with values from other sources and on best professional judgement.

Toxicity data that provide the basis for the majority of accepted effects thresholds are based on effects experienced by individual organisms under controlled laboratory conditions. There is therefore concern with the applicability of these data to reflect or predict population-level or community-level effects in the field. Adequate field data are lacking for most chemical stressors and receptor species, and laboratory-based data are therefore used and accepted in most cases to estimate effects in the field. Effects to individuals in the laboratory may or may not be representative of effects that may be seen in populations and communities in the field.

Effects data for surface water and sediment contaminants are considered to be associated with low to moderate uncertainty, respectively. There is considerably more uncertainty in the data used to evaluate the potential toxicity of contaminated sediments because ecotoxicity data for sediments are not as universally accepted or available as are ecotoxicity data for surface water.

The lack of relevant site-specific toxicity data increases uncertainty in this ERA to some degree. However, the availability of (1) site-specific COPC concentrations in multiple exposure media and locations, and (2) relevant and acceptable toxicity data for most COPCs, minimize these uncertainties to where they are unlikely to affect the outcome of the ERA.

Because site-specific effects or biological data are for the most part unavailable, a weight-of-evidence approach is used to assess potential for ecological effects. The weight-of-evidence approach used in this ERA, which relies on ecological effects data from a large variety of appropriate and relevant data sources, decreases the overall uncertainty compared to assessments based on only one or a few data sources.

4.0 Risk Characterization

Risk characterization integrates exposure data (e.g., COPC concentrations in surface water) and effects data (e.g., the maximum concentration of a COPC in laboratory water associated with no adverse effects in exposed organisms) to estimate risks. Risks for ecological receptors are assessed in this ERA on a media-specific basis. There is no appropriate method for combining ecological risks from multiple exposure sources because the relative contribution to total risk from each source (e.g., surface water, sediment, soil, ingested prey) is unknown. Also, the relative risk contribution from each source and for each species probably varies both spatially and temporally, primarily as seasonal migratory and dietary habits change.

4.1 Media-Specific Risks from Chemical Stressors

A large variety of chemical contaminants have been detected in onsite media, and this ERA is focused on assessing the risks from COPC exposures via direct contact with and ingestion of surface water (aquatic receptors) and direct contact with streambed sediment (aquatic receptors). Also of concern for COPCs that readily bioaccumulate is ingestion of contaminated food items. Numeric risk estimates are presented for COPCs in surface water and sediments

based on site-wide data. Data from all locations within a media type are combined, and the maximum values are based on the combined data set.

Risk estimates are based on the ratio of maximum and minimum detected COPC concentrations to selected effects concentrations. These tables therefore depict both reasonable "worst-case" risk estimates based on *maximum* detected COPC concentrations and lower limit risk estimates based on the *minimum* of detected COPC concentrations. Risks actually experienced by exposed local ecological receptors probably range between these two values, but are likely to vary spatially, temporally, and between receptor species. The risk estimates in these tables are listed in order of highest to lowest risk, based on the maximum risk estimates.

Risk estimates based on simple quotients or ratios of a single exposure concentration (e.g., maximum detected) to a single effects concentration (e.g., NOAEC) such as those included in the following tables are best interpreted in the context of "relative risk". That is, the numeric values are in themselves associated with considerable uncertainties, but the relative differences between risk estimates are useful for focusing on the major contributors to ecological risk. Ratios below 1.0 indicate little or no likelihood of adverse effects to exposed receptors, while higher ratios generally suggest greater likelihood of unacceptable risk. Higher risk estimates are not necessarily associated with severity of adverse effects. Potentially significant ecological risks (i.e., those >1.0) are identified in the tables by bold type.

4.1.1 Risks from COPCs in Surface Water (Direct Contact)

Table 7 presents the risk estimates for COPCs detected in surface water. With the exception of 1,1,1-trichloroethane, all ecological COPCs in surface water are associated with maximum risk estimates less than 1.0. The maximum risk estimate for 1,1,1-trichloroethane (3.3) is also of relatively minor concern because (1) the value is based on the *maximum* detected concentration, and (2) the risk estimate only slightly exceeds the 1.0 threshold. COPCs in surface water, with the possible exception of 1,1,1-trichloroethane, are therefore considered to be negligible contributors to potential ecological effects in surface water at the site.

Table 7
Risks from COPCs in Surface Water

COPC	Effects Concentration ug/L	Minimum Det. Conc. ug/L	Maximum Det. Conc. ug/L	Minimum Risk	Maximum Risk
1,1,1-trichloroethane	11	7	36	0.6	**3.3**
Pyrene	3	2	2.0	0.5	0.9
1,1-dichloroethane	47	23	30	0.5	0.6
1,2-dichloroethene (total)	590	31	54	0.1	0.1
Endosulfan II	0.051	0.002	0.0037	0.0	0.1

Table 7 Risks from COPCs in Surface Water					
COPC	Effects Concentration ug/L	Minimum Det. Conc. ug/L	Maximum Det. Conc. ug/L	Minimum Risk	Maximum Risk
Alpha BHC	2.2	0.0012	0.0012	0.0	0.0
Chloroethane	1630	10	10	0.0	0.0
Dieldrin	0.062	0.00086	0.00086	0.0	0.0
Diethylphthalate	210	2	2	0.0	0.0
4-nitrophenol	300	2	2	0.0	0.0
Endrin ketone	0.061	0.0023	0.0024	0.0	0.0
Endrin aldehyde	0.061	0.0022	0.0026	0.0	0.0
Gamma BHC (Lindane)	0.08	0.001	0.001	0.0	0.0
1,1-dichloroethene	25	1	1	0.0	0.0
Trichloroethene	47	1	1	0.0	0.0

4.1.2 Risks from COPCs in Sediment

Table 8 presents the risk estimates for COPCs detected in sediment. Three of the 19 COPCs detected in sediment are associated with maximum risk estimates greater than the 1.0 threshold. These are benzo(a)anthracene (6.1), methoxychlor (3.4), and chrysene (2.5). Maximum risk estimates for dieldrin (0.9) and pyrene (0.9) both approach but do not exceed the 1.0 threshold for significant risk. None of the COPCs detected in sediment greatly exceed the 1.0 threshold, suggesting relatively low potential for adverse effects from these COPCs. The cumulative risks from the three COPCs with maximum risk estimates greater than 1.0, along with those contributed by dieldrin and pyrene, may be ecologically significant. Assuming additivity, the total risk of all sediment COPCs remains quite low. In general, risk estimates are evaluated as <1.0 indicating no risk, 1.0 to 10 indicating low risk, 10 to 100 indicating moderate risk, and >100 indicating high risk. Maximum risk estimates for all other COPCs in sediment are sufficiently below the 1.0 threshold to suggest little potential for adverse ecological effects.

Table 8 Risks from COPCs in Sediment					
COPC	Effects Concentration ug/kg	Minimum Det. Conc. ug/kg	Maximum Det. Conc. ug/kg	Minimum Risk	Maximum Risk
Benzo(a)anthracene	110	38	230	0.3	**6.1**

Table 8 Risks from COPCs in Sediment					
COPC	Effects Concentration ug/kg	Minimum Det. Conc. ug/kg	Maximum Det. Conc. ug/kg	Minimum Risk	Maximum Risk
Methoxychlor	19	0.76	64	0.0	3.4
Chrysene	108	44	270	0.4	2.5
Pyrene	153	42	140	0.3	0.9
Dieldrin	110	0.21	0.4	0.5	0.9
Benzo(a)pyrene	140	54	54	0.4	0.4
Aldrin	2	0.37	0.37	0.2	0.2
Aroclor 1254	810	23	56	0.0	0.1
Benzo(b)fluoranthene	6200	94	510	0.0	0.1
Benzo(k)fluoranthene	6200	99	540	0.0	0.1
Phenanthrene	1800	56	240	0.0	0.1
Fluoranthene	6200	92	590	0.0	0.1
Endosulfan II	5.5	0.3	0.31	0.1	0.1
Bis(2-ethylhexyl)phthalate	890,000	140	430	0.0	0.0
Delta BHC	120	0.29	1.2	0.0	0.0
4,4'-DDE	110	0.22	0.4	0.0	0.0
4,4'-DDD	110	0.37	1.9	0.0	0.0
Alpha chlordane	2800	0.21	0.53	0.0	0.0
1,2-dichloropropane	701	2	13	0.0	0.0

4.1.3 Risks from COPCs in Food Items (Ingestion)

As discussed previously, a subset of six ecological COPCs are selected for a more extensive assessment of potential to adversely affect food chains or upper trophic level organisms. These nine COPCs (4,4'-DDD, 4,4'-DDE, aldrin, alpha chlordane, Aroclor 1254, dieldrin, endrin ketone, and endrin aldehyde), have potential to bioaccumulate to a greater degree than other ecological COPCs, based primarily on experimental bioconcentration factors (BCFs). BCFs are a function of chemical structure and characteristics, receptor characteristics, and exposure duration. Most organic COPCs that readily accumulate in biological tissues are lipophilic (attracted to fatty tissues). These COPCs generally do not bioaccumulate in plants to the same degree that they can in the fatty tissues of animals.

Risks to consumers of onsite animal prey from these COPCs will vary significantly depending on receptor species, season, exposure source and location, as well as numerous other factors. Risks to consumers from bioconcentratable COPCs are therefore based on representative species and reasonable worst-case exposure assumptions.

Representative receptors for this analysis are belted kingfisher, representing piscivorous birds, and red fox, a representative top predator. Exposure assumptions are based on EPA guidance and site-specific considerations. EPA and other guidance generally recommend conservative or potentially over-protective assumptions regarding food web models or dose calculations. These conservative assumptions have been incorporated into the analysis presented here. The uncertainties in exposure-related assumptions can be greatly reduced by the inclusion of site-specific biological data such as the concentrations of bioconcentratable COPCs in onsite prey species. Such data are not, however, available for this ERA.

This analysis therefore uses a simple food chain model to estimate the maximum daily dose of bioconcentratable COPCs that representative site receptors may receive. This model is based on the standard dose equations recommended by EPA. The equation used for this analysis is modified from equations recommended by EPA (1993) and is presented below.

$$MDD_{pot} = [Sum\ (C_{food} * DF * NIR_{food}) + (NIR_{water})] * SFF$$

where MDD_{pot} = Maximum Daily Dose (potential) - (mg/kg/d)
C_{food} = COPC Concentration in food item (mg/kg)
DF = Dietary Fraction (0-1.0)
NIR_{food} = Normalized Food Ingestion Rate (kg/kg body wt./d)
NIR_{water} = Normalized Water Ingestion Rate (L/kg body wt./day)
SFF = Site Foraging Frequency (0-1.0)
NIR = Normalized Ingestion Rate
(Ingestion Rate (kg/d) / Body Weight (kg))

This is considered a screening-level dose assessment because it is based on the *maximum* site-wide COPC concentrations in sediment and surface water. This approach is conservative because it uses maximum rather than average COPC concentrations and assumes that potentially exposed receptors consume food items and water from the most contaminated sources without dilution with uncontaminated or less contaminated food and water. It is assumed that COPCs for which MDD_{pot} values are below chronic effects threshold concentrations or recommended safe concentrations have low likelihood of adverse food chain or food web effects.

Equation input parameters such as food ingestion rate, water intake rate, dietary composition, body weight, etc. for the two representative organisms (belted kingfisher and red fox) are taken from Exposure Factors Handbook (EPA 1993). Where multiple values are presented, the average is used. BCFs are taken from EPA water quality criteria documents if available or estimated from Kow using structure/activity relationships presented in EPA 1988a. Bioaccumulation factors (BAFs), which include both food and water intake, are estimated from

literature-based BCFs (which include water uptake only) and from site-specific or predicted sediment/water partition factors using equilibrium partitioning. The dose calculations presented in Table 9 include both intake of drinking water and prey items, based on maximum detected COPC concentrations in surface water and sediment.

MDD_{pot} values are derived and presented in Table 9 for each of the nine COPCs that are highly bioconcentratable. These values are compared to chronic effects threshold concentrations (mg/kg/d) or recommended safe concentrations (mg/kg/d) for the representative ecological receptors. Effects data are based on sublethal effects in test organisms related to representative receptors. For example, effects data for red fox are based primarily on laboratory data for dogs, while kingfisher data are based on toxicity results from other bird species such as quail and mallard duck. The uncertainties associated with these extrapolations are offset to some degree by the use of conservative assumptions. The dose calculations therefore probably overestimate rather than under-estimate dose-related risks for the representative receptor groups.

Sublethal effects data for test organisms are adjusted for the body weights and ingestion rates of representative receptors. Also, most laboratory effects data for birds and mammals are based on COPC concentrations in the diet (mg/kg diet), and these values are adjusted for ingestion rates and body weights to derive daily dose values (mg/kg/d).

Table 9
Maximum Daily Dose (mg/kg/d) Calculations for Selected COPCs and Ecological Receptors

Calculated Dose / Limit	DDD	DDE	Aroclor 1254	Dieldrin Aldrin	Endrin Ketone	Endrin Aldehyde	Alpha Chlordane
Belted Kingfisher dose	0.0001	0.0000	0.0019	0.0046	0.0030	0.0033	0.0000
Belted Kingfisher dose limit (mg/kg/d)	40 mallard duck oral LC_{50}/100	16 est. from DDT	16.6 mallard duck oral LC_{50}/100	0.40 sparrow LD_{50}/100	0.83 quail, reduced egg production (est. from endrin)	0.83 (est. from endrin)	0.25 rec. dietary limit for birds
Red Fox dose	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
Red Fox dose limit (mg/kg/d)	20 adrenal cortex atrophy	0.5 est. from DDT LD_{50}/100	0.0143 rec. daily dietary limit for dogs	0.2 reproductive effects in raccoon	0.1 dog, increased liver size (est. from endrin)	0.1 (est. from endrin)	0.075 NOAEL dog

The results of the screening level dose calculations reveal little likelihood of significant adverse effects to upper trophic level organisms from onsite or near-site exposures to 4,4'-DDD, 4,4'-DDE, aldrin, alpha chlordane, Aroclor 1254, dieldrin, endrin ketone, and endrin aldehyde. In no case does the maximum calculated dose for representative piscivorous birds and top mammalian predators exceed recommended or critical dietary thresholds for relevant species.

4.2 Uncertainty Evaluation - Risk Characterization

By definition, uncertainties in risk characterization are influenced by uncertainties in exposure assessment and effects assessment. Uncertainties in exposure assessment are considered to be minimized by the extensive recent sampling and analysis of surface water and sediment. Descriptions of the magnitude and distribution of COPCs within the site are considered to be reasonably representative of actual conditions to which ecological receptors may be exposed.

Effects data can also contribute to overall uncertainty in risk characterization. At one extreme, for example, there are no toxicologically-based effects data for certain COPCs in sediment, hence there is a high degree of uncertainty associated with these chemicals. At the other extreme, effects data from multiple sources are available for many COPCs in surface water. There is obviously more confidence in risk estimates based on highly certain effects data compared to risk estimates based on data extrapolated from other related species, other chemicals, or estimated toxicological data based soley on chemical structure or properties.

Another source of uncertainty is the simple food web model used to assess food web impacts or impacts due to ingestion of prey contaminated with one or more of the COPCs previously identified as highly bioconcentratable. All models, including simplified models such as the one used in this ERA to evaluate bioaccumulation in upper trophic level predators, are associated with uncertainty. In general, more complex models have greater potential to introduce unacceptable levels of uncertainty unless critical and specific information on input parameters are available. For example, aquatic food web models have been established that calculate biomagnification factors (BMFs) for organic contaminants from exposure media through all major trophic levels to top predators. These models often require the use and evaluation of input parameters that are currently unknown, such as contaminant depuration rates for a particular species. Often, values for other species or even other chemicals are used to represent the required input parameter. These models are often sensitive to slight differences in input parameter values, and results can therefore be highly uncertain. The uncertainty in resulting BMF estimations for higher trophic level organisms are also magnified because the model is based on addition and multiplication of values from lower trophic levels. For these reasons, complex computer-based food chain models are not considered appropriate for this assessment.

Where potential levels of uncertainty could adversely affect the results of the assessment, conservative approaches were taken that may result in over-protection of some local species. For example, many simple food chain models commonly predict, largely as a result of home range estimates, little or no risk to top predators from ingestion of contaminated prey. The site foraging factor (SFF) calculated from large home range estimates can therefore "drive" the model output (i.e., the daily dose) for certain potentially important species. As discussed

above, the foraging behavior of individual organisms and even populations are sufficiently unknown to warrant a more conservative or protective approach. To err on the side of over-protection is considered prudent and, in fact, follows regulatory guidance. This ERA therefore uses a SFF of 1.0 for all receptors, based on the assumption that (1) all foraging takes place onsite (a reasonable assumption for most representative species) and (2) all foraging takes place at contaminated areas (a very conservative assumption for estimating "worst case" scenarios).

Another potentially significant cause of uncertainty in the food web model is the variability of values associated with certain input parameters to the model. Averaging the range of available values (e.g., body weights, intake rates, etc.) is expected to limit uncertainty to an acceptable degree in most cases. For example, there is reasonable concurrence by investigators on input parameters such as body weights and intake rates. In contrast, there is greater variability in literature values for BCFs and, to a lesser degree dietary fractions. These values are therefore more uncertain. Finally, LOAECs, criteria, and recommended limits are based on national databases or are intended to protect large and diverse groups of organisms (i.e., aquatic life, mammals, etc.). These values may therefore be over- or under-protective of certain local species and/or populations. It is unlikely that this assessment underestimates risk because conservative approaches are used where appropriate, and any uncertainties are probably biased towards over-protection.

Science and scientific investigations can not prove any hypothesis beyond doubt. The scientific method is instead based on stating hypotheses, testing these hypotheses, and either accepting or rejecting the hypotheses based on the evidence provided by test data. Test data may include both high quality data as well as highly uncertain data. Cause and effect relationships can be inferred from these data, and evidence can support hypotheses, but cause and effect relationships can rarely be proven regardless of the quality of the data. The risk assessment summary presented below discusses the results testing the three primary hypotheses presented in the Problem Formulation stage of the ERA.

These hypotheses are tested by using an approach that provides support for either rejection or acceptance of the proposed hypotheses. No data are conclusive. Even site-specific effects data, for example, are subject to concerns of representativeness because test species and conditions may not represent actual conditions. More general literature-based toxicity data may not be sufficiently applicable to the site being investigated. There are also concerns about laboratory-to-field extrapolation of effects data. Taxa-to-taxa extrapolations are a concern as well. All effects data are therefore subject to some degree of uncertainty. Confidence in the ability of selected effects data to assess potential for ecological risks varies for each data value selected. While each and every effects data value used in this and every other ERA is associated with some degree of uncertainty, it is the general trend described by the comparisons between exposure concentrations and effects concentrations, and the overall confidence in such comparisons, that are most important.

The impact of cumulative risks or effects from exposure to multiple chemical stressors is another area of uncertainty in the ERA. As stated previously, it is generally assumed that risks from individual chemical stressors are additive. This assumption is based on limited data where

the effects of exposures to multiple chemicals were investigated. The actual impact of exposure to multiple chemical stressors on ecological receptors is unknown because additive toxicity has not been confirmed for most chemical combinations.

Finally, the risk characterization method itself can contribute to uncertainties in the ERA. The simplified approach used here to calculate risks, termed the quotient method, is a useful screening-level approach that may not be appropriate for more complete investigations. The uncertainties common to this method are minimized in this ERA by evaluating multiple sources of data for deriving appropriate effects data rather than relying on a single data source. Quantitative effects data used in this ERA include a variety of criteria, thresholds, recommended safe values, and effects concentrations that are selected for use based on relevance and acceptability.

4.3 Summary and Conclusions of the Ecological Risk Assessment

Risks to ecological receptors are summarized below, within categories designated as LOW RISK and NO RISK. No sources of MODERATE or HIGH RISKS are identified for this ERA. The differentiation of LOW and NO RISKS is used to evaluate the *relative* risks associated with specific stressors compared to all other potential contributors to risk. These designations are based on both the quantitative risk estimates presented previously and best professional judgment.

LOW RISK

- *Sensitive aquatic biota* such as benthic invertebrates can be adversely affected by direct contact with *surface water* in the creek adjacent to Area 7. The only COPC of concern in water at this location is:

  1,1,1-trichloroethane

- *Similar organisms* may be additionally at risk from direct contact with creek *sediments.* Major sediment-associated COPCs at this location include:

  benzo(a)anthracene
  methoxychlor
  chrysene

NO RISK

- Aquatic and semi-aquatic organisms do not appear to be at significant risk from any other COPCs identified at this site.

- Consumers of aquatic and semi-aquatic organisms (e.g., piscivorous birds, omnivorous upper trophic level predators), represented by belted kingfisher and red fox, respectively, do not appear to be at significant risk.

The primary hypotheses for this ERA, initially presented in the Problem Formulation phase of the ERA, are re-evaluated here and used to help summarize risk conclusions. These are discussed below:

Chemical contaminants are not present in surface water or sediment onsite or adjacent to the site

Exposure data support the REJECTION of this hypothesis because contaminants have been detected in creek water and sediments.

The concentrations of chemical contaminants are not sufficiently elevated to impair the survival, growth, or reproduction of sensitive ecological receptors

Effects data support the REJECTION of this hypothesis because a limited number of chemical contaminants are present in surface water or sediments at concentrations sufficiently elevated to elicit adverse effects in sensitive exposed receptors.

Known or potential ecological receptors are not sufficiently exposed to chemical contaminants to cause adverse population-level or community-level effects

The integration of exposure and effects data suggest that certain types of ecological receptors (e.g., benthic invertebrates) may be low levels of risk under certain exposure scenarios (e.g., if they reside primarily in contaminated areas. This hypothesis can not therefore be UNCONDITIONALLY ACCEPTED based on available data. The evidence presented in this ERA suggests that this hypothesis should be REJECTED for portions of the creek where contaminant concentrations exceed risk-based thresholds. It is therefore considered prudent to REJECT this hypothesis for limited and specific locations.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

DATE: September 2, 1999

SUBJECT: *Southeast Rockford December 16, 1998 Sampling Preliminary Analytical Results*

FROM: John Frank, Ecology Technical Center Intern, Superfund Division, Remedial Response Section 1
Brenda Jones, Ecologist, Superfund Division, Remedial Response Section 1

TO: Jerry Willman, Project Manager, Illinois Environmental Protection Agency

The purpose of this memo is to provide comments to the Illinois Environmental Protection Agency and Russell Hart, USEPA regarding the *Southeast Rockford December 16, 1998 Sampling Preliminary Analytical Results.*

The maximum concentration of each analyte was compared to an ecological screening benchmark obtained from one of several sources. The results of this analysis as well as the benchmark sources are contained in Tables 1 and 2. Because this is a preliminary screening of potential ecological risk, a conservative approach is warranted. Consequently, maximum concentrations of contaminants were evaluated and the lowest (most conservative) screening benchmark was used.

Of the 41 analytes found at detectable levels in sediment for which ecological screening benchmarks are available, 16 exceed the appropriate benchmark. Most analytes that exceed benchmark values are polycyclic aromatic hydrocarbons (PAHs). Refer to Table 1 for more details on sediment contaminants.

Of the 34 analytes found at detectable levels in surface water for which ecological screening benchmarks are available, 8 exceed the appropriate benchmark. Most analytes that exceed benchmark values are metals. Refer to Table 2 for more details on surface water contaminants.

The exceedance of many of the benchmarks for both sediment and surface water suggests that additional sampling is justified in order to further characterize the potential ecological risk at the site.

As stated in the previous memo, USEPA has been provided with very little information regarding the ecological setting of the site. Therefore, it is difficult to ascertain what possible receptors are at risk as well as the ecological significance of the site itself.

Please address any comments or questions to John Frank (312-886-7180, **frank.john@epa.gov)** or Brenda Jones (312-886-7188, jones.brenda@epa.gov).

cc: Russell Hart

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TABLE 1

Sediment Contaminant Maximum Concentrations and Ecological Screening Benchmarks

SAMPLE	ANALYTE	MAX CONC. (mg/kg)	BENCHMARK (mg/kg)[2]
X101	Naphthalene	0.063 (*)[1]	0.0346 (Canada interim; Florida threshold)
X101	Acenaphthene	0.170 (*)	0.00671 (Canada interim; Florida threshold)
X101	Dibenzofuran	0.091	-
X101	Fluorene	0.180 (*)	0.010 (NOAA lowest threshold)
X101	Phenanthrene	1.300 (*)	0.049 (Canada interim)
X101	Anthracene	0.240 (*)	0.03162 (ARCS threshold)
X101	Carbazole	0.310	-
X101	Fluoranthene	1.600 (*)	0.03146 (NOAA lowest threshold)
X101	Pyrene	1.300 (*)	0.04427 (NOAA lowest threshold)
X101	Benzo(a)anthracene	0.690 (*)	0.0317 (Canada interim)
X101	Chrysene	0.740 (*)	0.02683 (NOAA lowest threshold)
X101	Benzo(b)fluoranthene	0.870	-
X101	Benzo(k)fluoranthene	0.340 (*)	0.0272 (NOAA lowest threshold)
X101	Benzo(a)pyrene	0.590 (*)	0.0319 (Canada interim)

X101	Indeno(1,2,3-cd)pyrene	0.440 (*)	0.01732 (NOAA lowest threshold)
X101	Dibenzo(a,h)anthracene	0.110 (*)	0.00622 (Canada interim; Florida threshold)
X101	Benzo(g,h,i)perylene	0.390 (*)	0.170 (Ontario low)
X102	Di-n-butylphthalate	0.110	-
X102	Vinyl chloride	0.028	-
X102	Chloroethane	0.014	-
X102	Acetone	0.029	-
X102	1,1-Dichloroethane	0.110	-
X102	1,2-Dichloroethane (total)	0.190	-
X102	1,1,1-Trichloroethane	0.062	-
X102	Trichloroethene	0.004	-
X102	Aluminum	12600.00	58030.00 (ARCS probable)
X102	Barium	102.00	-
X101	Calcium	29100.00	-
X102	Cobalt	5.10	-
X102	Chromium (+3 or +6)	17.50	26.00 (Ontario low)
X102	Copper	15.10	16.00 (Ontario low)
X102	Iron	13400.00	-
X102	Potassium	1320.00	-
X101	Magnesium	14400.00	-
X102	Manganese	252.00	460.00 (Ontario low)
X102	Sodium	551.00	-
X102	Nickel	12.10	16.00 (Ontario low)

X102	Lead	88.90 (*)	30.20 (Florida threshold)
X102	Vanadium	31.20	-
X102	Zinc	78.80	94.15 (NOAA low)
X101	Heptachlor epoxide	0.0026 (*)	0.00060 (Canada interim)

1 (*) = maximum analyte concentration exceeds ecological screening benchmark

2 ARCS probable = Assessment and Remediation of Contaminated Sediments (ARCS) Program of National Biological Service for USEPA Great Lakes National Program Office - Probable Effect Concentration (PEC)
http://www.hsrd.ornl.gov/ecorisk/reports.html (sediment report, Table 4, p.17)

Canada interim = Canadian Sediment Quality Guidelines for the Protection of Aquatic Life - Interim Freshwater Sediment Quality Guidelines (ISQGs)
http://www.ec.gc.ca/ceqg-rcqe/sediment.htm

Florida threshold = Florida Department of Environmental Protection, Office of Water Policy - Sediment Quality Assessment Guidelines (SQAGs) Threshold Effect Levels
http://www.dep.state.fl.us/dwm/documents/sediment/default.htm (Table 5, p.77)

NOAA lowest threshold = National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQUIRTs) - Freshwater Sediment Lowest ARCs *H. azteca* Threshold Effect Level (TEL)
http://response.restoration.noaa.gov/living/SQuiRT/SQuiRT.html

Ontario low = Ontario Ministry of the Environment - Lowest Effect Level
http://www.hsrd.ornl.gov/ecorisk/reports.html (sediment report, Table 4, p.17)

TABLE 2

Surface Water Contaminant Maximum Concentrations / Ecological Screening Benchmarks

SAMPLE	ANALYTE	MAX CONC. (ug/L)	BENCHMARK (ug/L)[2]
S203	bis(2-Ethylhexyl)phthalate	13.00	-
S202	Vinyl chloride	48.00	-
S202	Chloroethane	87.00	-
S201	Acetone	17.00	-
S202	1,1-Dichloroethene	88.00	-
S202	1,1-Dichloroethane	1000.00 E, 1300.00 D	-
S202	1,2-Dichloroethene	1700.00 E, 2200.00 D	-
S202	Chloroform	10.00	-
S202	1,2-Dichloroethane	40.00	100.00 (Canada)
S202	1,1,1-Trichloroethane	1200.00 E, 1800.00 D	18000.00 (NOAA acute)
S202	Trichloroethene	22.00	-
S201	Tetrachloroethene	10.00	-
S201	1,1,2,2-Tetrachloroethane	10.00	-
S201	Toluene	10.00 (*)[1]	2.00 (Canada)
S202	Xylene (total)	21.00	-
S204	Aluminum	27900.00 (*)	5-100.00 (Canada)
S204	Arsenic	149.00	150.00 (AWQC)
S204	Barium	1840.00	-
S204	Beryllium	1.40	5.30 (NOAA chronic)
S204	Calcium	217000.00	-

S204	Cobalt	31.00	-
S204	Chromium (+3 or +6)	46.90 (*) for Cr +3	11 (+3), 74 (+6) (AWQC)
S204	Copper	84.90 (*)	9.00 (AWQC)
S204	Iron	527000.00 (*)	1000.00 (AWQC)
S204	Mercury	0.39	0.77 (AWQC)
S204	Potassium	4530.00	-
S204	Magnesium	77200.00	-
S204	Manganese	8670.00	-
S203	Sodium	11900.00	-
S204	Nickel	46.00	52.00 (AWQC)
S204	Lead	108.00 (*)	2.50 (AWQC)
S204	Antimony	7.00 (*)	3.0 (NOAA chronic)
S204	Vanadium	90.10	-
S204	Zinc	340.00 (*)	120.00 (AWQC)

1 (*) = maximum analyte concentration exceeds ecological screening benchmark

2 AWQC = USEPA - Ambient Water Quality Criteria Freshwater Criterion Continuous Concentration (CCC)
National Recommended Water Quality Criteria - Correction EPA 822-Z-99-001 April 1999

Canada = Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Water Quality Guidelines
http://www.ec.gc.ca/ceqg-rcqe/water.htm

NOAA = National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQUIRTs) - Freshwater Acute or Chronic
http://response.restoration.noaa.gov/living/SQuiRT/SQuiRT.html

Response to Comments on
The Draft Ecological Risk Assessment for Area 7
Southeast Rockford Source Control Operable Unit

Information Needs and Clarifications

A description of the ecology of Area 7 is not available.

The references provided in Table 6 can be used to obtain specific information on the study details used to derive effects concentrations. A brief description of the categories of effects concentrations is given below.

EPA chronic criteria are based on laboratory toxicity studies in which a variety of freshwater fish, benthic and water column invertebrate species are exposed to laboratory water "spiked" with a range of concentrations of a specific chemical toxicant. Chronic tests are short-term tests (generally 48 hours to seven days) with test endpoints related to effects on organism survival, growth, and reproduction. Criteria are generated from regression analysis of all test data, with the four most sensitive organisms having the most influence on the final criterion.

Secondary chronic values were derived by Oak Ridge National Laboratory in a manner similar to that used by EPA to derive chronic criteria. The primary difference is that ORNL's Secondary Chronic Values are based on smaller datasets that did not meet the minimum requirements of EPA.

Threshold effects levels derived by the Florida Department of Environmental Protection (FDEP) used an approach similar to that used by NOAA to derive Effects Range-Low (ER-L) and Effects Range-Median (ER-M). These levels are based on coastal marine and estuarine sediment chemistry and associated biology. Chemical concentrations predicted to be associated with adverse biological effects are ranked, and ER-L represents the 10th percentile of ranked concentrations. ER-M represents the median concentration. FDEP calculates the Threshold Effects Level (TEL), which is the mean of the 15th percentile in the data set. FDEP also calculates the Probable Effects Level (PEL), which is the geometric mean of the 50th percentile of the data set. All of these thresholds are based on effects to a variety of benthic macroinvertebrates.

The equation used to estimate BCF from log K_{ow} is that of Veith and Kosian (1982) in EPA 1988a. The equation follows:

$$\log BCF = 0.79 \log K_{ow} - 0.40$$

As stated in the ERA, the input parameters for estimated maximum daily doses of bioconcentratable COCs were taken from EPA's Exposure Factors Handbook (EPA 1993). These input parameters include the following:

Species	NIR (food) g/g-d	NIR (water) g/g-d	Dietary Fraction
Belted Kingfisher	0.83	0.11	0.8 fish 0.2 inverts
Red Fox	0.10	0.085	0.6 mammals 0.25 birds 0.1 plants 0.05 inverts

The concentration of COCs in food items are estimated by multiplying the maximum COC concentration in exposure media (e.g., surface water, Table 1) by the COC-specific BCF or bioaccumulation factor (BAF), taken from Table 3 of the ERA.

The reference in the ERA on Page 19 to the EPA-recommended EP approach is intended only to identify the source of the various sediment thresholds used in the ERA. The Jones, Suter, and Hall 1997 document was used as a source for several different types of sediment thresholds, including those based on EPA's recommended EP approach. The literature reference was not intended to imply that this was an EPA document.

Choice of Receptors and Media

Early on in the ERA process it was decided by all interested parties that this ERA should be a screening level ERA rather than a full baseline ERA. This ERA was therefore focused on the major exposure pathways and most likely contributors to ecological risk. Not all exposure pathways and receptors were assessed in the ERA, and inhalation-related exposures that might be caused by VOCs in surface soils, for example, were not assessed.

Similarly, amphibians were also not directly or fully assessed in the ERA. However, amphibians are indirectly assessed in the ERA by using water quality criteria and other surface water benchmark concentrations that in some cases include or are based on toxicity data associated with amphibian exposures.

Rock River Impacts

As stated above, this ERA was focused on the major exposure scenarios with the greatest likelihood of contributing to ecological risk. Area 7 was the primary area of interest for this ERA. It is agreed that the Rock River is of greater ecological significance than Area 7. However, little or no useable data existed at the time the ERA was conducted to assess Rock River impacts.

It was assumed that Rock River impacts would warrant investigation if hazardous chemicals with significant mobility were expected to be transported offsite via groundwater discharge or surface water runoff. Data are currently lacking to make such an assessment, but as indicated by EPA, there does not appear to be a great

likelihood of offsite transport of those COCs with the highest potential to cause adverse ecological effects (e.g., pesticides, PCBs).

The assumption that the Rock River is at little risk from site-related contamination is based on the information presented in Tables 7 (SW) and 8 (SED) of the ERA. Table 7 reveals that the *maximum* hazard quotient for surface water COCs is 3.3 (1,1,1-trichloroethane)—no other SW COC has a maximum HQ above 1.0. It must be emphasized that these are maximum HQs and therefore may overestimate average risks. This COC may be present in groundwater and there is some potential for groundwater transport to the Rock River. However, data are currently unavailable to assess this possibility.

Maximum sediment-associated hazard quotients above 1.0 are limited to benzo(a)anthracene (6.1), methoxychlor (3.4), and chrysene (2.5). These COCs are expected to bind strongly to sediments. Offsite migration is therefore most likely only if significant surface transport of onsite sediments is expected. Again, these are maximum HQs that may overestimate average or most likely risk. Finally, as stated above, data are currently unavailable to assess the migration of onsite sediments to the Rock River.